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REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUT. COMMANDER L. M. GARRETT, U. S. N., COMMANDING, AND OF OTHER EXPEDITIONS OF THE "ALBATROSS," 1888–1904.

XXI.

THE SPONGES.

2. THE ERYLIDAE.

By ROBERT VON LENDENFELD.

WITH EIGHT PLATES.

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I. DESCRIPTION OF THE SPECIES COLLECTED BY THE "ALBATROSS."

Erylidae.

Tetraxonia with rhabd and teloclade megascleres, and a superficial armour composed of aspidasters[1] and microrhabds. Euasters are always present in the choanosome.

Sollas[2] divided the family Geodidae (Geodiadae) of Gray[3] into the two subfamilies Erylina and Geodina, and placed the geodid genera Erylus, Caminus, and Pachymatisma in the former. Later authors, I[4] among others, have not retained these subfamilies and have placed the three genera named, together with the typical genus Geodia and its allies, in the family Geodidae. The genera Caminus and Pachymatisma are not represented in the collections of the "Albatross," so that I have not been able to give any new data concerning their systematic position during this work. The genus Erylus on the other hand is well represented, and the examination of the "Albatross" material has shown that, as I have already stated in the first part of this monograph (*ante* p. 17), Erylus differs very considerably from Geodia the typical genus of the Geodidae. I therefore now not only revert to Sollas's (*loc. cit.*) original proposition of dividing the family Geodidae into two subfamilies but propose to go even farther and to place Erylus in a separate family: the Erylidae.

The question whether other genera (Pachymatisma, Caminus) should also be placed in this new family I shall not, for the reason given above, discuss here, and I leave them, for the present at least, in the Geodidae; the description of

[1] The aspidasters are those spicules of the Erylidae which were previously termed sterrasters. They are distinguished from the sterrasters of the true Geodidae by passing, during their development, through a stage with perfectly smooth surface which does not occur in the development of the sterrasters of Geodia and its allies, and also by their flattened, disc-like shape.

[2] *W. J. Sollas.* Tetractinellida. Rept. voy. "Challenger," 1888, **25**, p. cxlvii.

[3] *J. E. Gray.* Notes on the arrangement of sponges. . . . Proc. Zool. soc. London, 1867, p. 492.

[4] *R. v. Lendenfeld.* Tetraxonia. Tierreich, 1903, **19**, p. 84.

the Pacific species, not in the "Albatross" collection, will be found in the first part of this monograph.

The family Erylidae thus comprises the single genus Erylus.

ERYLUS Gray.

With uniporal afferents and uniporal efferents or larger oscules. Without ana- or protriaenes.

There are in the "Albatross" collection twenty-two specimens which belong to four species, one of which is divided into three varieties. All the species and varieties are new.

Erylus oxyaster, sp. nov.

Plate 3, figs. 29–35; Plate 4, figs. 1–43.

I establish this species for a specimen obtained in the Galapagos Islands. Its asters are oxyasters and to this the name refers.

The single, somewhat fragmentary specimen (Plate 4, fig. 24) is 30 mm. in maximum diameter and consists of two rounded lobose parts, one of which is broad cushion shaped, the other slender, digitate. The surface is smooth and bears numerous small afferent pores. These are quite uniformly distributed and 0.7–1 mm. apart. On the summit of the broader of the two lobes an irregularly circular oscule, 1.8 mm. in diameter, is situated.

The *colour* of the surface of the sponge (in spirit) is brown. A small part of it, which was probably sheltered from the light, is much lighter than the rest. The interior is light greenish yellow.

The superficial part of the body is differentiated to form a *cortex* 450–650 μ thick. This is composed of two layers, an outer layer, 75–120 μ thick, occupied by microrhabds, and an inner layer 360–560 μ thick, occupied by aspidasters.

Canal-system. Many of the afferent pores appear to be quite closed. The open ones (Plate 4, fig. 25) are circular and surrounded by fine sphincter-membranes in which numerous more or less radially disposed microrhabds are situated. These pores are 30–60 μ wide. They lead into radial canals which traverse the cortex and open out into subcortical cavities the radial diameters of which are usually greater than the paratangential.

The *skeleton* consists of regular rhabd megascleres, irregular derivates of these, microrhabds, teloclades, aspidasters, and oxyasters. The rhabd megascleres are for the most part amphioxes, but a few styles have also been observed. These rhabds and their irregular derivates form bundles which extend radially from the base of the sponge to the cortex and abut vertically on the latter. The microrhabds occupy in dense masses the outer layer of the cortex. The superficial ones are situated paratangentially, the deeper ones mostly obliquely or radially. The teloclades are mostly regular dichotriaenes, but some irregular dichotriaene-derivates and simple plagiotriaenes have also been observed. The cladomes of these teloclades extend paratangentially; just below the cortex their rhabdomes are directed radially inward. The oxyasters form a series from small many-rayed to large few-rayed ones. As, however, the asters of medium diameter and ray-number are not nearly so numerous as the large few-rayed and small many-rayed ones, this series does not appear uniform and large few-rayed and small many-rayed oxyasters can readily be distinguished. The large few-rayed oxyasters are quite uniformly scattered throughout the choanosome; the small many-rayed ones on the other hand, although also present in all parts of the choanosome, are much more numerous in the subcortical region, particularly in the roofs of the subcortical cavities and the walls of the cortical canals, than elsewhere. The aspidasters, which occupy the inner layer of the cortex, are rather irregularly arranged. They exhibit hardly a trace of a paratangential orientation.

The *regular amphioxes* (Plate **4**, figs. 6–9) are isoactine, gradually attenuated towards the ends, and usually rather sharply pointed (Plate **4**, figs. 6–8), more rarely blunt (Plate **4**, fig. 9). They are straight (Plate **4**, fig. 6) or slightly and uniformly curved (Plate **4**, figs. 7, 9), exceptionally abruptly bent in the middle (Plate **4**, fig. 8). The amphioxes are 1.8–2.9 mm. long and 60–85 μ thick.

The rare *styles* (Plate **4**, figs. 10, 11) are slightly curved, simply rounded off at one end and gradually attenuated towards the other, which is usually very blunt. They are 1.9–2.3 mm. long and 60–105 μ thick.

The *irregular derivates of the rhabd megascleres* (Plate **4**, figs. 12–19) have similar dimensions to the regular rhabds. They appear as more or less curved amphioxes, either strongly angularly bent near one end, or provided with one or more branches. The angle in the angularly bent forms (Plate **4**, figs. 12–13) is 15–95°. The branched forms bear one (Plate **4**, fig. 15) or, more frequently, two (Plate **4**, figs. 16, 19) or three branches (Plate **4**, figs. 17, 18), which arise either from the same part (Plate **4**, figs. 16, 19) or from different parts of the shaft (Plate **4**, figs. 17, 18). The branches are always very much shorter than the shaft, rarely over 400 μ long, straight, conical, and terminally either pointed (Plate **4**, figs. 16, 17, 18 the upper right one, 19) or rounded (Plate **4**, figs. 15, 18 the upper left and the lower one). The angle at which they arise is very variable. Sometimes two similar branches lie opposite each other in a straight line (Plate **4**, fig. 17 the two lower ones, 19). The axial threads of the shaft and the branches are either joined in a regular manner, or slight irregularities occur at their junction. The most remarkable of these were observed in the two spicules represented on Plate **4**, figs. 15 and 18. The axial thread of the single branch of the former and that of the lowest one of the latter do not reach down to the axial thread of the shaft, which passes the junction unaltered, but terminate with a bulbous thickening at a distance of about 3 μ from it.

The *microrhabds* (Plate **3**, figs. 29–31, 32a, 35a; Plate **4**, figs. 28–33a) are more or less curved, centrotyle amphistrongyles, and generally isoactine. The curvature is either uniform or one or both ends are also abruptly bent in the direction of the curvature. The isoactine microrhabds are usually 31–47 μ long, but occasionally very much larger ones, up to 93 μ in length, are observed (Plate **4**, fig. 31). The ordinary microrhabds are, near the centre (tyle), 3.5–4.5 μ thick; the tyle measures 4.5–5.5 μ, usually about 1 μ more than the adjacent parts of the spicule, in diameter. Towards the rounded ends the actines taper gradually to about 2 μ. The rare giant microrhabds are thicker in proportion to their greater length. The centre of the spherical tyle usually lies in the axis of the spicule; sometimes, however, it is eccentric and then the tyle bulges much more on one side than on the others. In some microrhabds one actine is reduced in length; these appear as anisoactines. In a few one of the actines is completely suppressed; these appear as blunt tylostyles. The anisoactine microrhabds are shorter and also somewhat thicker than the ordinary isoactine ones.

The rare *plagiotriaenes* (Plate **4**, fig. 20) have a straight, conical rhabdome, about 0.9 mm. long and, at the cladomal end, 75–90 μ thick. The clades are nearly straight, about 0.7 mm. long, and enclose angles of 109–112° with the rhabdome. The breadth of the cladome is 1.3–1.4 mm.

The *regular dichotriaenes* (Plate **4**, figs. 1–5, 21–23) have a fairly straight, conical rhabdome, 0.6–1.6 mm. long and, at the cladomal end, 70–105 μ thick. The main clades are straight, 250–400 μ long and enclose angles of 109–120° with the rhabdome. The end clades are conical, pointed, and straight or, more rarely, slightly curved inwards (Plate **4**, fig. 5, below), and 50–450 μ long. The cladome is 0.9–1.5 mm. broad.

In the rare *irregular dichotriaene-derivates* either the clades are reduced in number or the rhabdome reduced in length, or both. Forms with two and with only one clade (dichodiaenes and dichomonaenes) have been observed. The reduced rhabdomes are cylindrical, rounded at the acladomal end, 200–

600 μ long, and about as thick as the rhabdome of the regular dichotriaenes. In such rhabdomes the axial thread terminates some distance from the acladomal end, in the centre of its hemispherical surface. In the dichotriaene-derivates with reduced clade number, the central parts of the axial threads of both the rhabdome and the clades usually exhibit considerable irregularities.

The *oxyasters* (Plate **3**, figs. 32c, d, 33d, 34c, 35b, d; Plate **4**, figs. 26d, 27b, 28c, 29f, 30d, f, 32–34e, 38–40) usually have a slight central thickening. This is most clearly discernible in the monactine (Plate **4**, fig. 27b) and diactine forms (Plate **3**, fig. 35b; Plate **4**, fig. 28c). The rays are from one to twenty or more in number, concentric, regularly distributed, and usually equal in size. They are perfectly smooth (Plate **4**, figs. 38–40), conical, and pointed. Very rarely one or two rays are reduced in length, much shorter than the others, and terminally rounded (Plate **3**, fig. 34c). The properly developed rays of the small oxyasters (Plate **4**, figs. 39–40) are uniformly attenuated towards the pointed end, those of the large ones (Plate **4**, fig. 38) attenuated more rapidly in their distal than in their proximal part. The rays are 6–55 μ long and, at the base, 0.8–4.5 μ thick. The whole aster measures 10–90 μ in diameter. The ray-number is, as the following table shows, in inverse proportion to the size of the rays and, apart of course from the monactines, of the whole aster.

Number of rays	1	2–3	4–5	6–9	10–13	14–20 or more
Total diameter of aster, μ	57	48–90	45–75	32–58	15–23	10–17
Length of rays measured from centrum, μ	55	29–50	27–40	19–38	9–14	6–10
Basal thickness of rays, μ	4.5	3–1.5	3–4.5	1.7–1.5	2–3.5	0.8–1.5

As mentioned above there is a kind of gap in the series of these oxyasters, produced by the scarcity of forms 20–35 μ in diameter with from nine to eleven rays.

Most of the *aspidasters* (Plate **4**, figs. 35–37, 41–43) are stout oval discs. Very rarely roundish (Plate **4**, fig. 41) or irregular aspidasters have been observed. The ordinary oval aspidasters are 208–243 μ long, 125–150 μ broad and in the middle 30–40 μ thick. Towards the margin they thin out gradually. The average proportion of length to breadth to (central) thickness is 100 : 63.3 : 15.7.

The umbilical pit is more or less circular in outline, 30–50 μ broad, and about 15 μ deep. Its walls are usually quite smooth. The rest of the surface of the adult aspidaster is covered with protruding rays, often somewhat irregularly distributed, and 1.4–1.7 μ thick. These rays bear terminal verticils of usually six to eight lateral spines (Plate 4, figs. 36, 37). The youngest aspidasters observed were about 55 μ long and appeared as oval, radially striated discs with deeply serrated margins. In a more advanced stage these spicules are smooth discs with slightly undulating margins. On the faces and the margin of such, small protuberances then make their appearance and these grow out to form the protruding rays of the adult aspidasters above described. The centre of the aspidaster is occupied by a rosette-shaped granule about 1.7 μ in diameter. Viewed in profile the adult aspidasters show a distinct stratification. The limits of the layers are smooth and nearly parallel to the two faces. Viewed *en face* they show fine straight striae radiating from the central granule.

This sponge was trawled in the Galapagos Islands, Station 2809, on April 4, 1888; 0° 50′ S., 89° 36′ W.; depth 82 m. (45 f.); it grew on a bottom of gray sand; the bottom temperature was 23.4° (74.1° F.).

The only known species which appears to be allied to the sponge described above is *E. polyaster* Lendenfeld from the Agulhas bank, South Africa. From this it differs, apart from minor peculiarities, by the aspidasters, which are, absolutely and relatively more than three times as thick in *E. polyaster* as in *E. oxyaster*, a difference, of course, quite sufficient for specific distinction.

Erylus sollasii, sp. nov.

Plate 1, figs. 1–48; Plate 2, figs. 1–26; Plate 3, figs. 1–28.

I establish this species for seven specimens obtained at five stations among the Hawaiian Islands. Among the known species of Erylus the one named after me by Sollas appears to be its nearest ally. I therefore return my distinguished friend's compliment by naming this new species after him.

The two specimens from Station 3847 are both small; one is partly light, partly dark in colour; in the other the whole of the surface is dark. Both the specimens from Station 3848 are large and whitish. The specimens from Stations 3849 and 4055 are large and dark. The specimen from Station 4062 is middle sized and light coloured.

The two specimens from Station 3848 are in every way identical; all the others differ to some extent from these and from each other. We have to deal therefore with six different forms. As is shown below, these six forms fall into three groups, which I consider as three distinct races. These I denominate I, II, and III. Race I contains four forms; the races II and III one each. The four forms of race I are designated A, B, C, and D. To race I, form A, belongs the partly light and partly dark specimen from South Molokai (Station 3847); to race I, form B, the small, entirely dark specimen from South Molokai (Station 3847); to race I, form C, the two large whitish specimens from South Molokai (Station 3848); to race I, form D, the middle-sized, light-coloured specimen from northeast Hawaii (Station 4062); to race II the large dark specimen from South Molokai (Station 3849); and to race III the large dark specimen from northeast Hawaii (Station 4055).

Shape and size. The smallest specimen is the entirely dark one from Station 3847 (race I, form B). It is massive, lobose, covered with small but relatively high gyriform ridges, and measures 18 by 9 mm. It has one oscule, about 1 mm. wide, which lies on the summit of a slight elevation. The partly light, partly dark specimen also from Station 3847 (race I, form A) is an irregular mass, with still higher gyriform ridges and measures 24 by 17 by 13 mm. It has two oscules, the larger 1.8 mm. in diameter, and numerous small pores, which are scattered over its surface. The specimen from Station 4062 (race I, form D) is meandric, has small, but relatively quite high, gyriform ridges and measures 36 by 27 by 18 mm. Here and there small apertures are observed on its surface. Of the two specimens from Station 3848 (race I, form C) one (Plate 1, fig. 27) is meandric, while the other appears as a mass with lobose, somewhat digitate processes 7–12 mm. thick. The former measures 60 by 35 by 20 mm., the latter is only 51 mm. long. A few oscules, up to 1.5 mm. wide, are situated on the elevations, and groups of small pores are scattered over the other parts of the surface. The specimen from Station 3849 (race II) (Plate 1, fig. 28) appears as an aggregate of vertical digitate parts about 15 mm. thick, which are joined for the greater part of their length. It is 73 mm. high, 64 mm. long, and 42 mm. broad. From the surface ridges protrude which are about 1 mm. high and 2.5 mm. apart. These ridges are somewhat curved and most of them extend longitudinally, parallel to the vertical axis of the sponge. On or near the summit of each digitate protuberance an oscule is situated. The largest of these oscules is oval and measures 3.2 by 2 mm.; the other oscules are 1–2.5 mm. wide and more or less circular. On the sides of the digitate parts groups of small pores are met with. At one place there is a group of six much larger apertures about 1 mm. wide; here the sponge seems to have been injured some time before its capture. The specimen from Station 4055 (race III) (Plate 3, fig. 27) is an irregular lobose mass with small gyriform ridges on parts of its surface and measures 78 by 62 by 40 mm. On or near the summits of some of the lobes oscules are observed. The largest are oval and measure 4 by 2 mm. The other parts of the surface are occupied by groups of small pores.

In regard to their *colour* the (spirit) specimens differ to a considerable extent. The two specimens from Station 3848 (race I, form C) are for the most part yellowish white, only some of the protruding parts having a purplish brown tinge. The specimen from Station 4062 (race I, form D) is dirty light brownish gray. The lower, basal portion of the partly dark, partly light-coloured specimen from Station 3847 (race I, form A) is light gray, the upper portion dark chestnut-brown. In the entirely dark specimen from the same Station (race I, form B), the surface is dark chestnut-brown throughout. The specimen from Station 3849 (race II) is dirty brownish purple, some parts of its surface being considerably darker than others. The specimen from Station 4055 (race III) is rather dark purple-brown.

The superficial part of the body is differentiated to form a *cortex* (Plate 1, fig. 1a). This is 100–250 μ thick and composed of an outer, middle, and inner layer. The outer, dermal layer is generally quite insignificant and on parts of the surface of most of the specimens absent altogether, probably rubbed off. In those parts of the cortex of race II where it is most highly developed, it attains a thickness of 30 μ. This layer is rich in microrhabds, but contains no fibres and no aspidasters. The middle layer is from 83 μ (in parts of the cortex of race II) to 210 μ (in parts of the cortex of race III) thick and occupied by dense masses of aspidasters. The inner layer is often insignificant and hardly to be made out in the sections. In race I, form C, it attains in places a thickness of 20–30 μ. It is composed of paratangential fibres and contains a few granular cells and groups of granules.

Granular cells, oval to spherical in shape and 12–18 μ long, are abundant in most of the specimens. These cells are most numerous just below the cortex and here often quite densely packed (Plate 1, fig. 3). They also occur scattered in the interior of the choanosome. These cells are filled with granules of fairly equal size. In the granular cells of pale parts of the sponge, particularly in the region overgrown with symbionts, the granules are colourless. In the subcortical and cortical granular cells of the dark and exposed parts the granules are brown. Both the colourless and the brown granules stain deeply with aniline-blue. As mentioned above a few granular cells and groups of granules also occur in the inner layer of the cortex. These groups of granules are massive, flattened, or drawn out so as to appear like strings of beads. Some of the granules forming these groups are similar to the granules in the granular cells, others are larger. They seem to be remnants of disintegrated granular cells.

Canal-system. The afferent apertures, which, as mentioned above, generally form groups on the surface, are uniporal. They are always circular but they differ very considerably in size, their diameter varying between 70 and 520 μ. The largest pores were observed in race I, form C, and in race III. From each pore a canal leads vertically downwards. This canal penetrates the cortex and opens out into one of the subcortical cavities which underlie the poral areas of the cortex. Its proximal opening into the subcortical cavity is surrounded by a chonal sphincter usually more or less contracted, but only rarely completely closed. The canals leading down from small pores are distended, those leading down from large pores constricted below the entrance. I am inclined to ascribe these differences and also, to a great extent, the differences in the width of the pores themselves, to differences in the degree of contraction. The afferent canals, which arise from the subcortical cavities and lead down into the choanosome, are not particularly wide and divide into numerous narrow branch-canals which supply the flagellate chambers. The latter (Plate 1, fig. 4) are spherical or somewhat compressed in the direction of their axis, and measure about 20 μ in diameter. The efferent canals join to form lacunose cavities, which sometimes attain a very considerable width (Plate 1, fig. 1). They open out on the surface with the oscules described above.

Skeleton. Loose strands of rhabd megascleres traverse the choanosome. Their distal portions extend more or less radially and they terminate just below the cortex. Triaenes with radial, centripetally directed rhabdomes are quite abundant in the subcortical layer. In some of the sections a few spicules of this kind have also been found in the interior of the choanosome. I do not consider that as their natural position, however, and believe that these triaenes were brought there from the subcortical layer in cutting the section. No megascleres protrude beyond the surface, and this is entirely destitute of a spicule-fur. Microrhabds occupy in large numbers the outer layer of the cortex and are found in smaller numbers also in the choanosome, chiefly in its distal parts. In the outer, cortical layer of the cortex these microrhabds are not regularly arranged; some are situated paratangentially, others obliquely, and others radially. The middle layer of the cortex is occupied by dense masses of aspidasters, most of which are arranged paratangentially, with their broad faces parallel to the outer surface. Only around the pores some of them are differently situated; these turn one broad side towards the pore-canal and the edge towards the outer surface of the sponge. Young and adult aspidasters also occur scattered in the choanosome. In some specimens aspidasters are rather numerous in the choanosome. In all parts of the choanosome acanthtylasters are met with. These asters, particularly the small many-rayed ones, are more numerous in the subcortical region than in the interior. In the spicule-preparations of race I, form C, large smooth-rayed oxyasters up to 56 μ in diameter, and in those of race III small smooth-rayed oxysphaerasters (Plate 3, fig. 26b) have been observed. I consider these asters, which were not found *in situ* in the sections, as foreign spicules. About the foreign nature of the small oxysphaerasters in the spicule-preparations of race III there can indeed be no doubt, as a Donatia-like sponge-crust, containing such oxysphaerasters in large numbers, covers parts of its surface.

The *rhabd megascleres* (Plate 1, figs. 29–35, 42–48; Plate 3, figs. 19–22) are for the most part blunt amphioxes (Plate 1, figs. 29–31, 33, 44–46; Plate 3, figs. 19, 20, 22). Besides these also sharp-pointed amphioxes (Plate 1, figs. 34, 35, 42, 43, 47, 48), amphistrongyles (Plate 1, fig. 32), and styles (Plate 3, fig. 21) occur. Generally these rhabds are rather uniformly curved (Plate 1, figs. 29–31, 33–35, 42, 43, 46–48; Plate 3, figs. 19–22), rarely straight (Plate 1, figs. 32, 45), or abruptly bent near one end (Plate 1, fig. 44; Plate 3, fig. 18). The styles and particularly the amphistrongyles are curved much less than the amphioxes. The rhabds are 425–980 μ long and 8–24 μ thick. The longest are found among the amphioxes, the thickest among the amphistrongyles and styles. The small specimens, race I, forms A and B, have smaller rhabds than the larger ones. Among the latter race I, form D, and race III have larger rhabds than race I, form C, and race II. Besides these simple rhabds, spicules similar in shape and size, possessing however a short branch-ray, are met with, chiefly in race III. In these mesomonaene-like rhabd-derivates the branch-ray (clade) is pointed or blunt, up to 50 μ long, and situated near one end, in styles thus branched near the pointed end. The branch-ray is either turned upwards proclade-, or downward anaclade-fashion. (See table, p. 277.)

Most of the adult *microrhabds* (Plate 1, figs. 37–41a, 39b, 41b; Plate 2, figs. 16–18; Plate 3, figs. 13–15, 26a) are quite stout, slightly and uniformly curved, centrotyle, isoactine amphioxes. Most of them are blunt, some sharp pointed. Sharp-pointed microrhabds are particularly frequent in race III. The blunt amphiox microrhabds are often somewhat constricted just below their ends, so that the ends themselves appear as terminal knobs (Plate 2, fig. 18).

DIMENSIONS OF RHABD MEGASCLERES.

		Race						all forms	
		I				II	III		
		Form							
		A	B	C	D			limits	general average of the largest three
Length	of all the spicules measured, μ	425–650	530–730	470–760	530–880	450–760	720–980	425–980	
	average of the three longest, μ	630	710	747	853	743	913		766
Thickness	of all the spicules measured, μ	8–13	8–14	10–24	10–22	9–20	12–22	8–24	
	average of the three thickest, μ	12	13	22	20	19	21		18

Besides these greatly preponderating isoactine forms, some anisoactine ones, with one actine shortened and rounded at the end (Plate 1, figs. 39b, 41b), are met with. In some of the microrhabds of race I, form A, and race II this reduction has gone so far that one actine is absent altogether. Such spicules appear as styles (tylostyles). Also branched microrhabds, composed of more than two actines, have occasionally been met with. These are most frequent in race I, form B. Most of them are tetractine and appear to have been produced by an early concrescence of two simple microrhabds lying crosswise. Two opposite rays of such spicules usually form a microrhabd of similar dimensions to the ordinary ones. The microrhabd represented by the two other rays is usually considerably shorter. Rarely the two microrhabds presumably composing these spicules are equal in length. Their axis generally encloses small angles, 30° or less; rarely these angles are greater; forms with axis crossing at right angles are exceedingly rare. Sometimes the one microrhabd is attached to the other by its end; such spicules appear as triactines. The tyle is usually a simple spherical thickening. In the isoactine forms it occupies the centre, in the anisoactine forms it lies nearer to one end than to the other, and in the microrhabds with one actine quite suppressed, it is situated terminally. In a few of the microrhabds of race I, form D, the tyle is irregular and appears as a cluster of rounded protuberances.

No correlation between the size of the sponge and the dimensions of its microrhabds is discernible. The thickness of these spicules is about the same in all the forms; their length however varies, those of race III being considerably shorter than those of the races I and II, although the specimens of some of these (race I, A and B) are very much smaller. The microrhabds are 30–78 μ long and 2.5–5 μ thick. The tyle is 0.3–1.5 μ thicker than the adjacent parts of the spicule and measures 3.5–6.5 μ in diameter.

DIMENSIONS OF MICRORHABDS.

		Race						all forms	
		I				II	III		
		Form							
		A	B	C	D			limits	general average of the largest three
Length	of all the spicules measured, μ	46–76	39–56	30–57	38–78	39–61	30–44	30–78	
	average of the three longest, μ	65	54	56	62	58	44		56.5
Thickness	of all the spicules measured, μ	2.5–5	2–4	3.5–5	3.5–5	3.1–4.3	3–4.5	2.5–5	
	average of the three thickest, μ	4.7	3.8	4.8	4.8	4.1	4.3		4.4
Diameter of tyle	of all the spicules measured, μ	4–6.5	3–5	3.8–6	4–6	3.5–5.5	3.5–5.5	3.5–6.5	
	average of the three largest, μ	5.8	4.8	5.7	5.7	5.2	5.4		5.4

The *triaenes* (Plate 1, figs. 5–26; Plate 3, figs. 1–6, 12, 23, 24) are ortho- or, more frequently, plagio-triaenes with simple or branched clades. The rhabdome is always straight. Usually it is simple and conical. Its acladomal end is sharp pointed (Plate 1, figs. 17, 19, 20; Plate 3, figs. 12, 23, 24) or blunt (Plate 1, figs. 15, 16, 24, 26). Sometimes slight knob-like protuberances are observed near the acladomal end. Rarely the rhabdome is reduced in length, cylindrical, and terminally rounded and slightly thickened (Plate 1, fig. 18; Plate 3, fig. 1). The properly developed, conical rhabdomes are 210–520 μ, the reduced, cylindrical ones 140–220 μ long. Their thickness at the acladomal end is 8–22 μ. Cylindrical rhabdomes are always thick; all the slender triaene-rhabdomes observed were conical. The triaenes of the small specimens (race I, forms A and B) have somewhat shorter and very much thinner rhabdomes than those of the larger ones. The averages of three thickest of the former being 10–13, those of the latter 18–21 μ. Among the large specimens the one of race III has far larger triaene-rhabdomes than those of the races I and II.

The cladomes of these triaenes are very polymorphic. Triaenes with simple clades occur in all the specimens. In race I, form A, no other triaenes were observed. In race I, forms B, C, and in race II a few triaenes with one, more rarely two or three branched (bifurcate) clades occur besides the ones with simple clades. The ramification of the triaene-clades is still greater in race I, form D, and in race III: in these the triaenes with branched clades are more numerous than the ones with simple clades.

In the triaenes with three simple clades (Plate 1, figs. 7, 11, 12, 15–20, 24–26) the clades are usually conical and blunt pointed, rarely reduced in length, cylindrical, and rounded at the end (Plate 1, figs. 16, 18). Such a reduction of the clades is usually associated with a reduction or other abnormity of the rhabdome. The simple triaene-clades are slightly and uniformly curved, concave to the rhabdome (Plate 1, figs. 17, 19), or nearly straight (Plate 1, figs. 22, 25), or, more rarely, abruptly bent down at the end (Plate 1, figs. 18, 20, 24). Their chords are 120–300 μ long.

As stated above, one, two, or all three clades of the triaenes may be branched. This branching is most frequently a simple and regular bifurcation, the two branches (end clades) being simple, and fairly equal in length and angular position (Plate 1, figs. 6, 9, the lower ones in fig. 10; Plate 3, the lower left ones in figs. 2, 3, 5, 6). Irregularities due to a difference in the length or the position of the two branches or to secondary ramifications of the branches are frequently met with. The difference in the length of two end clades forming a pair is caused by the reduction of one of them. This reduction sometimes becomes so great as to lead to a complete suppression of one of the end clades, in which case a single end clade arises from the, in such spicules usually somewhat thickened end of the main clade (Plate 1, fig. 8). The differences of position are frequently so great that one end clade appears as a continuation of the main clade (Plate 1, the upper one in fig. 5; Plate 3, the upper one in fig. 3). Some of these spicule-rays might indeed be considered as simple clades from which a branch-ray arises laterally. A secondary ramification of the end clades has been observed only in race I, form D, and in race III. It affects either both end clades of a pair in a similar manner (Plate **3**, the left ones in fig. 4) or one of them only (Plate **1**, the upper one in fig. 10; Plate **3**, the upper in fig. 2 and the right ones in figs. 2–5). The proportion of the length of the main clade to the length of the end clades is, as a comparison of figs. 6 and 9 on Plate **1** shows, subject to very considerable variation. The main clades are 70–270, the end clades 10–160 μ long. The cladomes are 160–550 μ broad. The triaenes of the small specimens of race I, form A, have the narrowest cladomes (average of the three largest 373 μ), those of the large specimen of race III, the broadest (average of the three largest 530 μ). The angle enclosed by the axis of the rhabdome and the chords of the simple clades and the stems (main clades) of the branched ones, is 86–116° (general average 103.4°). It is smallest in the triaenes of race I, form A (average 97°), and largest in those of races II and III (average 107 and 107.5°). Thus most of these spicules are plagioclades, some orthoclades. (See table, p. 281.)

In race II some spicules, 310–330 μ in diameter, composed of two simple (Plate **1**, fig. 13) or branched (Plate **1**, the right one in fig. 14) clade-like, and two short, conical, blunt rudimentary rays, have been observed. These spicules appear to be derivates of the triaenes described above.

The *acanthtylasters* (Plate **1**, figs. 36–40c; Plate **2**, figs. 1–4, 8–11; Plate **3**, figs. 7, 8, 25, 26c) are destitute of a central thickening and have from two to fourteen, a few perhaps more than fourteen, rays. The rays are concentric and nearly always uniformly distributed, simple, and equal in size. Acanthtylasters with rays unequally long or branched (bifurcate) have been only very rarely observed. The rays of the larger acanthtylasters (Plate **2**, figs. 1, 2, 8, 9; Plate **3**, figs. 7, 8) are cylindroconical and at the base 1–3 usually 1.5–2.3 μ thick. They taper distinctly towards the end, and are, at their thinnest point a short distance below the end, 0.7–1.5 μ thick. The rays of the smaller ones (Plate **2**, figs. 10, 11) are somewhat more cylindrical and only 0.4–1.5 μ thick. The rays invariably bear spines, some of which always congregate at the end of the ray and here form a terminal, acanthtyl cluster 1.3–3.5 μ in diameter. The size of the spines is on the whole proportional to the size of the aster. Apart from this they are subject to considerable variation. Sometimes numerous small and insignificant (Plate **3**, fig. 7), sometimes numerous medium sized (Plate **2**, figs. 8, 9), and sometimes only one or a few very large spines, 1–1.6 μ in length (Plate **2**, figs. 1, 2; Plate **3**, fig. 8), arise from the sides of the rays. In the two-rayed acanthtylasters a cluster of spines arises from the centre of the spicule.

DIMENSIONS OF TRIAENES.

			Race I, Forms A	Race I, Forms B	Race I, Forms C	Race I, Forms D	Race II	Race III	all forms: limits	all forms: general average of the largest three	all forms: general average
Rhabdome	length	of all the spicules measured, μ	210–400	140–360	220–470	200–420	240–400	180–520	140–520		
		average of the three largest, μ	373	290	397	380	380	490		385	
	thickness	of all the spicules measured, μ	10–15	8–10	10–22	10–22	12–20	13–22	8–22		
		average of the three thickest, μ	13	10	18	21	19	21		17	
Simple clades	length	of all the spicules measured, μ	120–215	170–280	120–270	175–270	120–240	225–300	120–300		
Branched clades	length of main clades	of all the spicules measured, μ		150–230	100–200	80–140	120–185	70–270	70–270		
	length of end clades	of all the spicules measured, μ		30–50	20–40	60–160	10–60	10–130	10–160		
Cladome	breadth	of all the spicules measured, μ	160–380	370–460	215–490	290–470	170–450	280–550	160–550		
		average of the three largest, μ	373	413	457	450	417	530		440	
Clade- (main clade) angle		of all the spicules measured	89–107	100–107	89–115	86–112	95–116	98–115	86–116		
		average of all	97	103	105	101	107.5	107			103.4

This appears as a rudiment of a third ray. Most of the spines are conical, straight, and vertical, some conical and recurved (Plate 2, fig. 1), some irregular, cylindrical, terminally rounded or even thickened, and occasionally lobose at the end.

The acanthtylasters measure 10–38 μ in diameter. Their size is in inverse proportion to the number of their rays. To obtain a clearer insight into this correlation I measured (and counted the rays of) 207 of them and took the means of the diameters of those with the same ray-numbers. There is no difficulty in counting the rays of the large few-rayed acanthtylasters, but it is impossible to ascertain the ray-numbers of the small many-rayed ones with sufficient exactitude. I therefore calculated the means of the two- to nine-rayed acanthtylasters by themselves, but combined the ten- to fourteen-rayed ones in one group of which I took the mean. This mean can be taken as the mean diameter of the asters with a ray-number equivalent to the mean of 10, 11, 12, 13, and 14, that is twelve. In this way I found that the average diameter

of the acanthtylasters with two rays is 38 μ,
of those with three " 29 ",
" " " four " 28 ",
" " " five " 27 ",
" " " six " 25 ",
" " " seven " 23 ",
" " " eight " 21 ",
" " " nine " 19 ", and
" " " ten to fourteen (mean twelve) rays 14 μ.

Apart from the two-rayed asters, which are so few that I was unable to measure a number sufficient for attaining a reliable mean, the mean given above shows that there is a very regular decrease in size with increasing ray-number, amounting in the asters with from three to five rays to 1 μ and the asters with six or more rays to about 2 μ per unit of difference of ray-number.

In all the forms four- to ten-rayed acanthtylasters have been observed. The four- to six-rayed appearing to be the most frequent ones. In the forms A, C, and D of race I and in race II also three-rayed and in race II also a few two-rayed acanthtylasters were found. Acanthtylasters with more than ten rays have been found in all the forms except race I, form C. In the small specimens the acanthtylasters are not smaller than in the large ones. The largest acanthtylasters occur in the form A of race I and in the races II and III. (See table, p. 283.)

The *aspidasters*. The disc-shaped spicules of the cortical armour of the species of Erylus have hitherto been designated, like the ovoid spicules of the armour of Geodia, as sterrasters. Closer examination of these spicules in the species of Erylus of the "Albatross" collection has shown, however, that they differ from the sterrasters found in the species of Geodia and allied genera not only in their shape, but also in their mode of development, to such an extent that it is advisable to give them another name. Aspidaster, the name selected for them, has reference to their shield (ἀσπίς)- like shape.

DIMENSIONS OF ACANTHTYLASTERS.

		Race						all forms	
		I				II	III		
		Forms							
		A	B	C	D			limits	general average of the largest three
Number of rays		4–12	3–13	3–10	3–14	2–14	4–12	2–14	
Diameter	of all asters measured with six rays or fewer, μ	20–36	21–32	21–32	22–30	22–38	25–36	15–38	
	of all asters measured with seven or more rays, μ	10–27	6–20	17–22	12–27	12–24	13–24	10–27	
	average of the three largest, μ	33	29	31	29	35	33		31.7

The adult aspidasters of *Erylus sollasii* (Plate **1**, fig. 36d; Plate **2**, figs. 5–7, 12–15, 19–26; Plate **3**, figs. 9–11, 16, 17, 25d, 28) are 95–156 μ long, 55–82 μ broad, and 74–14 μ thick. The general average proportion of their length to their breadth to their thickness is 100:55.8:8.8. Optical transverse sections show that these disc-shaped spicules are gradually attenuated towards the margin, which is usually quite sharp. The shape of their outline is variable; some of them (Plate **2**, figs. 13, 23, 26; Plate **3**, fig. 9) are quite regularly oval, some rounded rhomboidal (Plate **2**, fig. 22; Plate **3**, figs. 10, 17), and some irregular (Plate **2**, figs. 12, 24, 25) with lobose marginal protuberances of which one or a few broad ones, or a larger number of narrow ones may be present. On one face of the disc there is a very shallow, more or less circular depression 20–30 μ in diameter. In this depression, which is obviously homologous to the umbilicus of the sterrasters of Geodia, the surface is either quite smooth, or bears only a few small rays or spines. From all the other parts of the surface (Plate **2**, figs. 5, 6; Plate **3**, fig. 28) and also from the margin, rays usually about 1–2 μ thick protrude. Those on the margin are about 1.5 μ long, those on the faces appear to be shorter. These rays are scattered rather irregularly and (measured from centre to centre) 2–6 μ apart. Each ray bears a terminal verticil of four to ten lateral spines. The centre of the aspidaster is occupied by a small group of granules, from which very numerous and perfectly straight radial lines extend towards the margin. In some adult aspidasters this radial structure is well defined (Plate 2, fig. 7), in others it can hardly be made out.

There appears to be a certain degree of correlation between the size of the sponge and the size of its aspidasters, the latter being smaller in the small specimens of race I, forms A and B (average length of the three largest of these forms 118 and 120 μ respectively), larger in the middle-sized specimen, race I, form D (that average 124 μ), and still larger in the large specimens of race I, form C, and races II and III. Among the latter those of races II and III (that average 150 and 152 μ) are very considerably larger than those of race I, form C (that average 128 μ), and the other smaller forms of race I. Also in their shape the aspidasters of the different forms differ to a certain extent, those of race II being much more slender and those of race I, form C (Plate 2, fig. 25) much more irregular than those of the others. Also in the number of the ray-spines differences are observed, the rays of the aspidasters of race II bearing up to ten, those of the aspidasters of the races I and III only from four to six lateral spines.

DIMENSIONS OF THE ASPIDASTERS.

		Race						all forms		
		I				II	III			
		Forms								
		A	B	C	D			limits	general average of the three largest	general average
Length	of all measured, μ	102–121	95–120	105–130	107–126	120–156	128–153	95–156		
	average of the three longest, μ	120	118	128	124	152	150		132	
Breadth	of all measured, μ	57–68	55–70	59–73	60–75	60–76	71–82	55–82		
	average of the three broadest, μ	67	69	73	73	75	82		73	
Thickness	of all measured, μ	7.4–12.2	8.2–10.4	10	11.2–12	9.2–11.4	12–14	7.4–14		
	average of the three thickest, μ	11.6	10	10	11.6	11	14		11.6	
Average of proportion of length to breadth to thickness, μ		100: 55.3: 8.2	100: 59.1: 9	100: 57: 8.4	100: 56: 9.8	100: 49.8: 7.6	100: 57.7: 10			100: 55.8: 8.8

Young aspidasters were found in considerable numbers scattered throughout the choanosome in several specimens. They are imbedded in the ground substance. A special membrane or plasmatic sheath enclosing them could not be made out even in sections strongly stained with aniline-blue.

The youngest (smallest) aspidasters observed (Plate 2, fig. 14) were oval discs, about 25 μ long and 10 μ broad, and composed of numerous exceedingly slender and perfectly straight rays which radiated from a granular centrum about 3 μ in diameter. These rays are, at first, quite isolated. They grow in length and in thickness and so the whole aspidaster increases in size (Plate 1, fig. 36d; Plate 3, fig. 25d) and the basal parts of the rays become united. The solid, central mass of silica thus produced forms a disc from the margin of which the still isolated, distal parts of the rays protrude (Plate 2, fig. 19; Plate 3, fig. 16). When this stage is reached the longitudinal growth of the rays slows down or ceases altogether, while the transverse growth of the rays, that is their increase in thickness, continues. In consequence the marginal spines become joined more and more (Plate 2, figs. 20, 21) until they entirely lose their individuality, the margin of the aspidaster becoming quite smooth. In young forms of regular aspidasters this smooth, non-serrated margin is continuous (Plate 3, fig. 11), in young forms of irregular ones lobose (Plate 2, fig. 15). Not only the margin but also the two broad faces of such young aspidasters are smooth. Their smoothness in this stage constitutes the chief difference between them and the sterrasters of Geodia, which do not pass through a smooth stage during their development. Later small, spine-like protuberances make their appearance on the surface of the smooth young aspidaster. These develop into the protruding rays with terminal verticils of lateral spines, which have been described above.

LOCALITIES AND NATURE OF ENVIRONMENT.

No. of Station	Locality	Date	Depth	Bottom temperature	Bottom	No. of specimens
3847	S. coast of Molokai, Lae-o Ka Laau Light. N. 61° 30′, W. 23°	April 8, 1902	42–44 m. (23–24 f.)	—	Sand and stones	2 Forms A, B (Race I)
3848	S. coast of Molokai, Lae-o Ka Laau Light. N. 68°15′, W. 22.4′	April 8, 1902	80–133 m. (44–73 f.)	21.7° (71.1° F.)	Sand and gravel	2 Form C (Race I)

LOCALITIES AND NATURE OF ENVIRONMENT (*continued*).

No. of Station	Locality	Date	Depth	Bottom tempera-ture	Bottom	No. of specimens
3819	S. coast of Molokai, Lae-o Ka Laau Light. N. 71°, W. 21.9′	April 8, 1902	133–78 m. (73–43 f.)	19.8° (67.6° F.)	Coarse sand, broken shells, and corals	1 Race II
4055	N. E. coast of Hawaii, Alia Point Light, Hilo Bay. N. 20°, W. 3.5′	July 16, 1902	91–121 m. (50–62 f.)	—	Fine gray sand and Foraminifera	1 Race III
4062	N. E. coast of Hawaii, Kauhola Light. S. 69°15′, E. 6.9′	July 18, 1902	152–207 m. (83–113 f.)	—	Coral, volcanic sand, shells, and Foraminifera.	1 Form D (Race I)

There can be no doubt that the seven sponges described above are very closely allied, still they differ to a certain extent in size, shape, colour, and spiculation. As to the size it is to be noted that the forms A and B of race I are very much smaller than the others. Since, however, the spiculation of these small specimens exhibits immature characters, there can be no doubt that they are young forms, that their small size is merely due to their age and of no systematic importance whatever. Neither can any importance be attached to the differences in shape, since they lie well within the limits of individual variation usual in sponges of this kind. The differences in colour, which ranges from dirty white to dark chestnut-brown, are indeed great. If, beginning with the lightest coloured one, we arrange the forms in the order of the degree of their pigmentation, we get, 1) race I, form C, 2) race I, form D, 3) race II, 4) race III, 5) race I, form A, and 6) race I, form B. If, beginning with the deepest, we arrange them in the order of the depth of the water at the place where they were found, we get, 1) race I, form D, 152–207 m.; 2) race I, form C, race II and III, 78–133 m.; and 3) race I, forms A and B, 42–44 m. Although it is unknown which of the specimens of race I, form C, race II, and race III grew in deeper, and which in shallower water, we see that the depth of the locality is, on the whole, roughly in inverse proportion to the degree of pigmentation. The darkest forms, the partly or wholly dark chestnut-brown, race I, forms A and B, grew in the shallowest water, at a depth of 42–44 m., to which, in clear tropical sea water, considerable day light penetrates. This and the fact that in some of the specimens the upper protruding parts are darker than the basal, lead me to suppose that these differences of colour are merely due to differences in the amount of light to which the different specimens were exposed during life. I am therefore inclined to consider these differences as direct individual adaptations of the simplest kind to which no systematic importance whatever can be attached.

The chief differences in the spiculation of the six forms is shown in the following tabular view of the averages of the three largest observed of the most important spicule dimensions and of the character of the triaene-cladomes and aspidasters.

Race			I				II	III
Form			A	B	C	D		
Rhabd megascleres		length, μ	630	710	747	853	743	913
		thickness, μ	12	13	23	20	19	21
Microrhabds		length, μ	65	54	56	62	58	44
		thickness of tyle, μ	5.8	4.8	5.7	5.7	5.2	5.4
Triaenes	rhabdome	length, μ	373	290	397	380	380	490
		thickness, μ	13	10	18	21	19	21
	cladome	breadth, μ	373	413	457	450	417	530
	character		all clades simple	most clades simple, some branched		most clades branched	most clades simple, some branched	most clades branched
Acanthtylasters		diameter, μ	33	29	31	29	35	33
Aspidasters		length, μ	120	118	128	124	152	150
		proportion of length to breadth to thickness	100: 55.3: 8.2	100: 59.1: 9	100: 57: 8.4	100: 56: 9.8	100: 49.8: 7.6	100: 57.7: 10
		character	few irregular, four to six ray-spines		many irregular, four to six ray-spines	few irregular, four to six ray-spines	few irregular up to ten ray-spines	few irregular, four to six ray-spines

This table shows that in race I, form A, all the triaene-clades are simple; and the rhabd megascleres shorter and thinner, the microrhabds longer and thicker, and the triaene-cladomes smaller than in any of the others. In race I, form B, most of the triaene-clades are simple; and the microrhabds thinner and shorter, and the aspidasters absolutely shorter and relatively broader than in any of the others. In race I, form C, most of the triaene-clades are simple; and the rhabd megascleres thicker and the aspidasters more irregular than in any of the others. In race I, form D, most of the triaene-clades are branched; and the triaene-rhabdomes relatively thicker than in any of the others. In race II most of the triaene-clades are simple; and the acanthtylasters larger, the aspidasters absolutely longer and relatively considerably narrower and thinner and their rays provided with a larger number of lateral spines than in any of the others. In race III most of the triaene-clades are branched; and the rhabd megascleres longer, the microrhabds very considerably shorter, the triaene-rhabdomes much longer, the triaene-cladomes much broader, and the aspidasters relatively thicker than in any of the others.

That the megascleres of race I, form A, are smaller in size and more simple in character than those of the other forms and that there are other differences of this kind, appears to be due to differences in the age (size) of the specimens. Some peculiarities, as for instance the irregularity of the aspidasters of race I, form C, may be pathological. Some are, no doubt, to be accounted for by differences in the external forces which acted on the different specimens. All these can be considered as mere somatic non-germinal characters, destitute of systematic significance. There remain however some, the nature of which is more doubtful and which might well be germinal. These peculiarities are the exceptional narrowness and thinness of the aspidasters and the richness of their rays in spines in race II, and the exceptional shortness of the microrhabds and the exceptionally large size of the triaene-cladomes in race III. If these peculiarities are considered germinal three systematic groups must be distinguished, one for the forms A, B, C, and D of race I, one for race II, and one for race III.

There can, I think, be no doubt that these three groups must be united in one and the same species; it is another question, however, whether or not varieties should be established for them. After a careful consideration I have decided that these differences are probably germinal and systematically important, but sufficient only for racial distinction, and I distinguish three races, designated I, II, and III, in this species accordingly.

Race I.

Rhabd megascleres 425–880 by 8–23 μ; centrotyle microrhabds 30–78 by 2–5 μ and a tyle 3–6 μ; triaenes with simple clades only, or with simple and branched clades, either the former or the latter predominating; rhabdome 104–470 by 8–22 μ, cladome 160–490 μ broad; acanthtylasters with from three to fourteen rays, 20–36 μ in diameter; aspidasters, regular or irregular, with from four to six ray-spines, 95–130 by 55–75 by 7.4–12.2 μ, average proportion of length to breadth to thickness 100 : 56.8 : 8.8. This race comprises four forms, designated, A, B, C, and D.

South Molokai, northeast Hawaii.

Race II.

Rhabd megascleres 450–760 by 9–20 μ; centrotyle microrhabds 39–61 by 3.4–4.3 μ, tyle 3.5–5.5 μ; triaenes with simple and with branched clades, the former predominating; rhabdome 240–400 by 12–20 μ, cladome 170–450 μ broad; acanthtylasters with from two to fourteen rays, 22–38 μ in diameter; aspidasters mostly regular, with up to ten ray-spines, 120–156 by 60–76 by 9.2–11.4 μ, average proportion of length to breadth to thickness 100 : 49.8 : 7.6.

South Molokai.

Race III.

Rhabd megascleres 720–980 by 12–22 μ; centrotyle microrhabds 30–44 by 3–4.5 μ, tyle 3.5–5.5 μ; triaenes with simple and branched clades, the latter predominating; rhabdome 180–520 by 13–22 μ, cladome 280–550 μ broad; acanthtylasters with from four to twelve rays, 25–36 μ in diameter; aspidasters, mostly regular, with from four to six ray-spines, 128–153 by 71–82 by 12–14 μ, average proportion of length to breadth to thickness 100 : 57.7 : 10.

Northeast coast of Hawaii.

The character of the canal-system and the spiculation show that these sponges belong to the genus Erylus. From all the species of this genus, with the exception of the one from Freemantle, S. W. Australia, which Carter[1] erroneously identified as *Erylus* (*Stelletta*) *euastrum* O. Schmidt and for which Sollas[2] established *Erylus lendenfeldi*, they differ very considerably. Sollas's description indicated, and a reexamination of the type, kindly placed at my disposal by

[1] *H. J. Carter.* Report on specimens dredged up from the Gulf of Manaar. Ann. mag. nat. hist., 1880, ser. 5, **6**, p. 136.

[2] *W. J. Sollas.* Tetractinellida. Rept. voy. "Challenger," 1888, **25**, p. 239.

Mr. Kirkpatrick, clearly shows, that this species also differs from *Erylus sollasii*. The chief differences between the two are the presence of asters 100 μ in diameter and exceedingly irregular aspidasters in *E. lendenfeldi*, and their absence in *E. sollasii*. These differences are quite sufficient for specific distinction.

Erylus rotundus, sp. nov.

megarhabda, var. nov.

Plate 5, figs. 18–23, 32; Plate 6, figs. 14, 18, 24, 33–35; Plate 7, figs. 22–30, 57–73; Plate 8, fig. 13.

typica, var. nov.

Plate 5, figs. 1–4, 11–17, 30; Plate 6, figs. 15–17, 25, 27, 30–32; Plate 7, figs. 16–21, 46–56.

cidaris, var. nov.

Plate 5, figs. 5, 26–28, 31; Plate 7, figs. 1–10, 42–45, 75, 76, 79; Plate 8, fig. 14.

I establish this species for thirteen specimens obtained at five different stations among the Hawaiian Islands. The aspidasters of these sponges are nearly circular in outline and to this the name refers.

The thirteen specimens represent seven distinct forms which fall into three groups. The latter I consider as varieties. One of these varieties possesses remarkable rhabd-clusters resembling certain Cidaridae in appearance, hence the varietal name *cidaris*. The other two varieties, which are destitute of these spicules, differ in respect to their microrhabds, these being very much larger in one of them than in the other. The former I name *megarhabda*; for the latter, which is the most frequent of the three, I have selected the name *typica*.

Two forms belong to the var. *megarhabda*, four to var. *typica*, and one to var. *cidaris*. The number of specimens and the habitat of each form are tabulated below:—

Erylus rotundus
- var. *megarhabda*
  - form A: 2 specimens from the south coast of Molokai (Station 3849);
  - " B: 1 specimen from the coast of Kauai (Station 3982);
- var. *typica*
  - form A: 4 specimens from the south coast of Molokai (Station 3849),
  - " B: 3 dark-coloured specimens from the coast of Kauai (Station 4024);

form C: 1 light-coloured specimen from the coast of Kauai (Station 4128);

" D: 1 specimen from the northeast coast of Hawaii (Station 4061);

var. *cidaris*

1 specimen from the south coast of Molokai (Station 3849).

Shape and size. The larger of the two specimens of var. *megarhabda*, form A (Plate 5, fig. 32), is upright, somewhat flattened, ellipsoid, 45 mm. high. Its largest and smallest horizontal diameters are 38 and 27 mm. respectively. The surface is rugose. The protruding ridges are high and irregular on the apex, lower and arranged in a more regular manner longitudinally, at the sides of the sponge. On the apex and the upper parts of the sides numerous circular or oval apertures, 0.1–0.7 mm. in diameter, are observed. The smaller specimen of this form is irregular, massive, 32 mm. long, and in part covered with foreign bodies, attached to the partly undulating, partly rugose surface. There are a few groups of apertures up to 0.8 mm. in diameter. The single specimen of var. *megarhabda*, form B, is irregular, massive, and 23 mm. long. To its rugose surface foreign bodies are attached. There is one group of six conspicuous apertures 0.7–1.4 mm. wide on the surface.

The largest of the four specimens of var. *typica*, form A (Plate 5, fig. 30), appears as an upright bunch of thick lobose parts, joined for the greater part of their length to form a continuous mass, from the upper side of which their free lobes protrude. The whole sponge is 67 mm. high; its largest and smallest horizontal diameters measure 69 and 72 mm. respectively. The lobose parts are 16–36 mm. thick and distally rounded. The surface is slightly rugose. On and near the summits of the lobes a few larger apertures, 1–2 mm. wide, are observed; the sides are occupied by numerous small pores. Considerable parts of the surface are covered by an incrusting composite ascidian (Plate 5, fig. 30). The other three specimens of this form are similar, but smaller, the smallest only 33 mm. high. To the surface of one of them numerous foreign bodies, fragments of shells, etc., are attached. The largest of the three specimens of var. *typica*, form B, is an irregular lobose mass, measuring 55 by 51 by 46 mm. It appears to be composed of more or less coalesced gyriform parts up to 10 mm. in thickness. Some of these terminate in slightly protruding digitate excrescences. The surface is penetrated by numerous small apertures and partly covered with symbiotic sponge-crusts and foreign bodies (fragments of shells, etc.). The other two specimens are similar and only slightly smaller. The smallest is 52 mm. long. One of them possesses, besides numerous small pores, two larger apertures (oscules) 1.5 and 2 mm. in diameter. The single specimen of var. *typica*, form C, is irregular, massive, and 34 mm. long. Several short, lobose protuberances arise from it. The surface is perforated by numerous small pores and foreign bodies are attached to parts of it. The single specimen of var. *typica*, form D, is an elongate mass, attenuated at one end to a digitate process, 5 mm. thick. The total length of the sponge is 44 mm. Small pores are scattered over its surface.

The single specimen of var. *cidaris* (Plate 5, fig. 31) is an upright, lobose mass, 67 mm. high. Its largest and smallest horizontal diameters measure 57 and 45 mm. respectively. Small irregular grooves are observed on its otherwise smooth, undulating surface. Here and there two adjacent grooves extend for some distance in parallel directions, enclosing a gyriform fold. The surface is perforated by numerous small pores, and a few crusts of symbiotic organisms, but no dead foreign bodies, are attached to it.

The *colour* of the interior of these spirit specimens varies from dirty white to light brown, that of the surface is subject to considerable variations. The upper part and the sides of the large specimen of var. *megarhabda*, form A, are dark purplish brown, the base and the interior being light dirty brown. Where the dark colour of the sides gradually merges into the light colour of the base, numerous whitish spots, marking the position of the — mostly closed — pores, are observed on the surface. The smaller specimen of this form is coloured in the same way, but the light-coloured part of the surface is here relatively more extensive. The single specimen of var. *megarhabda*, form B, is rather dark purplish gray.

Three of the specimens of var. *typica*, form A, are purplish brown above and light dirty brown below; one is bluish gray. The three specimens of var. *typica*, form B, are dark purplish black above and much lighter purplish brown below. The single specimen of var. *typica*, form C, is light purple with a small, considerably darker patch. The single specimen of var. *typica*, form D, is dirty white. The single specimen of var. *cidaris* is whitish with a large brown patch, in which numerous whitish spots, marking the position of the mostly closed pores, are observed.

The differences in the degree of pigmentation of these sponges are probably due to differences in the amount of light that fell on their surface during growth. I think that in the specimens not uniform in colour, the upper parts, which were more exposed to the light, became more strongly pigmented than the lower parts, which were more or less in the shade, and am inclined to ascribe the differences in the degree of pigmentation of the darkest parts of different specimens to differences in the amount of light due to differences in the depth at which they grew. Unfortunately the information about the depths given is not sufficiently exact to allow of a definite conclusion on this point.

The superficial part of the body is differentiated to form a *cortex*, composed of an outer and an inner layer. The outer layer is occupied by dense masses of spicules and appears as an armour. Under the outer exposed parts of the surface this armour usually is 65–90 μ, in the walls of sheltered cavities, extending farther into the interior, only 35 μ thick, or even thinner. Pigment cells occur in the armour between the spicules on the dark parts of the surface. The inner layer of the cortex is usually 55–75 μ thick and contains hardly any spicules. It is composed of paratangential fibres, pigment cells, and usually contains also granule cells.

The *pigment cells*, the number of which is in proportion to the degree of darkness of the surface, are nearly always elongate and usually extend paratangentially. They have one or, more frequently, several lobose or filiform processes, appear irregularly amoeboid, and are very variable in size, 6–29 μ long. The transparent plasm of these cells contains numerous apparently spherical granules, dark brown in transmitted light, which measure 0.3–0.8 μ in diameter. These granules are usually rather uniformly distributed throughout the body of the cell and its processes, but sometimes parts of the cell are free from them. Occasionally rows of single pigment granules, appearing like strings of beads, have been observed in the sections. These probably lie in (invisible) filiform processes of pigment cells.

In the distal part of the choanosome and in the lower layer of the cortex of forms A and B of var. *typica*, and also in some of the others, remarkable *granule cells* have been observed in large numbers. These cells appear to be situated in spherical, oval, or irregular cavities of the ground substance, 15–20 μ in diameter, which in some places lie very close together. The granule cells themselves are more or less spherical, measure 8–12 μ in diameter, appear hyaline, and stain slightly with haematoxylin and aniline-blue. They are either simple and structureless, or composed of a number, from ten to twenty or so, of polyedric parts 2–4 μ in diameter. The spaces between these parts appear to be empty. Rarely a more strongly stained, superficial layer and a body, which may be a nucleus, have been observed in the simple, undivided cells; and occasionally minute pigment granules are attached to, or contained in, the ones composed of polyedric parts. It is possible that the spaces between these cells and the walls of the cavities, within which they lie, and which appear to be empty, are in reality thick, hyaline, cell walls. But as these spaces are not stainable with any of the stains (eosin, malachite-green, magenta, aniline-blue, methyl-violet, azure, haematoxylin, aurantia, Bismarck-brown), I think this improbable. The cells composed of parts are much more numerous than the simple, undivided ones. The latter are scattered quite irregularly between the former and do not increase in number either towards the surface or towards the interior. Although convinced that the undivided ones and the ones composed of polyedric parts are merely different stages in the development of the same kind of cell, I am unable to say whether the simple ones arise from the composed ones or *vice versa*.

In the sections of var. *typica*, form B, groups of broad, irregularly oval cells, 28–32 μ long, were observed in the distal part of the choanosome. The plasm of these cells is granular and each one contains a large nucleus, about 8 μ in diameter. These cells appear to be ova.

In the sections of var. *cidaris* young larvae were observed. Some of these lay free on the canals, others appeared to be just on the point of emerging from the cavities of the ground substance in which they were bred. These larvae are spherical, measure 50–60 μ in diameter, and appear to consist of a central granular mass, surrounded by a single layer of roundish, not elongate cells about 8 μ in diameter.

In the choanosome of var. *typica*, form D, large numbers of monocellular symbiotic Algae were observed. These are spherical or oval, measure 15–20 μ in maximum diameter, and have a stout cell wall about 4 μ thick.

Canal-system. The uniporal entrances to the canal-system are usually circular, and, when quite open, 100–250 μ wide. Dilated pores of this width are however not frequent, most of the pores being more or less contracted and smaller, or closed altogether. The flagellate chambers are more or less spherical and measure 14–23 μ in diameter. Those of var. *cidaris* are smaller (diameter 14–17 μ) than those of the others. The collar cells clothing them are not numerous, distant, rather slender, and 4–6 μ long. The larger canals are surrounded by stout mantles of tissue free from megascleres and flagellate chambers. Some of them are traversed by sphincter-membranes. Such have been particularly observed in var. *typica*, form B. In the forms C and D of var. *typica* and in var. *cidaris* no apertures much larger than the pores described above, were observed on the surface. In these sponges the efferent openings (oscules) do not seem to be of much greater width than the afferents. In both forms of var. *megarhabda* and in some specimens of the forms A and B of var. *typica* on the other hand, larger oscules, up to 1.4 mm. wide in the former, and up to 2 mm. wide in the latter variety, have been observed. These larger oscules usually lie on or near the summit of protruding parts of the sponge. In some cases, as for instance in *megarhabda*, form B, large oscular tubes, up to 2.4 mm. in diameter, lead up to the oscules. In other cases, as for instance in var. *cidaris*, a tract of transparent tissue, about 1.7 mm. broad, free from megascleres and flagellate chambers, extends from each of the here strongly contracted or evenly closed oscules, down into the interior of the sponge. In the axis of this tract a row of small cavities is observed. These cavities, which in the radial sections appear to be isolated, are 100–150 μ broad, up to 350 μ long, and situated close together. Distally, towards the contracted oscule, they become smaller and scarcer. I consider these rows of cavities as the remnants of the lumen of the strongly contracted oscular tubes.

The *skeleton* consists of rhabd megascleres, microrhabds, triaenes, large acanthtylasters with not very numerous rays, small oxyasters with numerous rays, and aspidasters. In several forms also asters, resembling the acanthtylasters in size and ray-number, but with conical rays, which become very slender distally, have been observed. These spicules, which are particularly numerous in var. *megarhabda*, form A, are in all probability merely young stages of the ordinary acanthtylasters. I shall not therefore deal with them as a special spicule form. In var. *cidaris* aster-like rhabd-clusters have been observed.

Some of the rhabd megascleres are isolated, others form more or less undulating bundles (Plate **6**, fig. 25a), which traverse the internal parts of the choanosome in a radial or, in the digitate and lobose processes, longitudinal direction, and, on nearing the cortex, tend to assume a position vertical to the surface. These bundles are in var. *megarhabda*, form A, up to 100 μ broad. In the other forms most of the bundles are 10–40 μ thick. The broad bundles of var. *megarhabda*, form A, appear to be flattened, band shaped; the narrow ones are cylindrical. The isolated rhabds are, in the interior, quite irregularly scattered; near the surface, just below the cortex, most of them usually assume a position more or less vertical to the surface. This radial arrangement of the subcortical rhabds is particularly well marked in var. *megarhabda*, form A.

The asterose rhabd-clusters of var. *cidaris* are scattered in the choanosome.

In var. *megarhabda* the armour is composed chiefly of obliquely or radially situated microrhabds, aspidasters being relatively scarce and confined to its superficial part. In this variety numerous microrhabds also occur scattered in the choanosome. In vars. *typica* and *cidaris,* on the other hand, the armour is chiefly composed of aspidasters, and here the microrhabds are confined to its superficial part, except in the vicinity of the pores, around which they form mantles, extending right through the whole armour. Sometimes the superficial microrhabd-bearing part of the armour-layer is stout and well developed, and then it consists of an outer zone composed of paratangial microrhabds and an inner zone of oblique and vertical (radial) microrhabds, lying above and between the outermost aspidasters. Often, however, this microrhabd-bearing outer armour-layer is insignificant, and then composed only of relatively few, mostly oblique microrhabds. It is possible that the superficial parts of the sponges presenting this appearance have been rubbed off. The majority of the microrhabds in the pore-canal mantles are situated so that one of their ends points obliquely upward towards the centre of the pore. In some forms of var. *typica,* particularly in form B, a fair number of microrhabds were also found scattered in the choanosome.

The cladomes of the triaenes extend paratangentially just below the cortex or within its lower, fibrous layer; their rhabdomes are directed radially inward. The triaenes occupy the interporal spaces and in some forms, as for instance in var. *typica,* form A (Plate 6, fig. 27a), form well-defined groups, in which a number of triaenes lie close together at the points of intersection of the interporal zones.

The acanthtylasters and their oxyaster-like young are scattered throughout the choanosome. They are most abundant in one of the specimens of var. *megarhabda,* form A. In some forms, as for instance in var. *typica,* form B, they are very much scarcer in the subcortical region than in the interior of the choanosome. A great many acanthtylasters lie in the walls of the choanosomal canals. Some of the rays of these usually protrude into the canal-lumen. In the walls of the remnants of the contracted oscular tubes of var. *cidaris,* above referred to, the acanthtylasters stand particularly close together and here form a veritable pavement. This local acanthtylaster-density is doubtless due to the contraction of the surface on which, when normally extended, they are probably distributed in the ordinary, not particularly dense manner.

The small oxyasters with numerous rays are confined to the roofs of the subcortical cavities and the walls of the pore-canals. In the choanosome they appear to be entirely absent. In the walls of the pore-canals, where they are most numerous and sometimes form quite a dense layer, they extend right up to within a short distance of the outer surface. In one of the specimens of var. *megarhabda*, form A, I failed to find any of these asters *in situ* in the sections.

The aspidasters take part in the formation of the cortical armour and are also found scattered in the choanosome. In vars. *typica* and *cidaris* the greater part of the armour is composed of these spicules, which are here absent only in the mantles surrounding the pore-canals. Apart from these mantles, the proximal (internal) part of the armour in these varieties consists entirely of aspidasters. In the distal (external) part of the armour microrhabds are usually added to the aspidasters, and sometimes the outermost part of the armour consists entirely of microrhabds. Most of the aspidasters of the armour are situated paratangentially. Under exposed tracts of the surface they form many layers, under the sheltered parts of it which limit the cavities, extending into the interior, only few layers or only a single layer. In var. *megarhabda* the aspidasters form only a small part of the armour and are here confined to its distal (external) part. Young and also adult aspidasters are usually found scattered in the choanosome. Here they generally lie in cavities of the ground-substance, as long and broad but much wider (thicker) than the aspidasters, so that the margins of the aspidasters are in contact with the ground-substance, while their faces are separated from it by apparently empty spaces. Seen *en face* the aspidasters consequently appear to fill these cavities completely, seen in profile they appear as narrow bars occupying the long axis of the oval cavities. The empty spaces at their sides may of course have been produced by the shrinkage of the tissue, during the preservation of the sponges in alcohol, but they may also be natural, and in this case occupied possibly by some liquid, rich in silica secreted from the surrounding tissue, from which the cell or cells building the aspidaster draw their supply.

The *rhabd megascleres* (Plate 5, figs. 11–23, 26–28a) are for the most part simple amphioxes or amphistrongyles, curved uniformly, or in the middle more strongly than near the ends. Occasionally style (Plate 5, fig. 17c) and angularly bent or branched derivates of these rhabds have been observed. The ordinary amphioxes and amphistrongyles are 310–650 μ long, and 6–15 μ thick. Of the amphioxes and amphistrongyles occurring together in the same specimen, the former are on the whole longer than the latter. In the vars. *megarhabda* and *cidaris* nearly all the rhabds are sharp-pointed amphioxes (Plate 5, figs. 19–23, 26–28a), blunt amphioxes and amphistrongyles (Plate 5, fig. 18) being rare. In the forms B and C of var. *typica*, sharp-pointed amphioxes (Plate 5, figs. 14, 15, 17a) also preponderate; in the forms A and D of this variety, on the other hand, the blunt rhabds (amphistrongyles) (Plate 5, figs.

11–13, 16b) are more numerous than the sharp-pointed amphioxes. Some of the amphioxes, this was particularly observed in form B of var. *typica*, appear as amphistrongyles, the blunt ends of which are surmounted by small conical tips. These tips may be simple or terraced, telescope-like. Angularly bent or branched rhabd-derivates have chiefly been observed in form A of var. *megarhabda* and in var. *cidaris*. The spicules of this kind in the last-named variety appear as transitional forms connecting its aster-like rhabd-clusters with the ordinary rhabds.

The dimensions of the rhabd megascleres and the relative frequency of the sharp-pointed and blunt amphioxes and amphistrongyles in the different forms and varieties are tabulated below.

Rhabd megascleres		Erylus rotundus										
		var. megarhabda			var. typica					var. cidaris	
		A	B		A	B	C	D			
		South Molokai	Kauai	limits and means of averages of all the forms of the variety	South Molokai	Kauai, dark specimen	Kauai, light specimen	Northeast Hawaii	limits and means of averages of all the forms of the variety		limits and means of averages of all the forms of the species
Length	limits, μ	330–650	350–550	330–650	320–570	330–560	350–520	310–490	310–570	440–650	310–650
	average of the longest three, μ	603	543	573	556	533	507	477	518.3	617	518
Thickness	limits, μ	6–13	6–12	6–13	6–11	6–12	6–11	7–15	6–15	8–12	6–15
	average of the thickest three, μ	13	11	12	11	11	11	14	11.3	12	11.9
Shape		mostly sharp-pointed amphioxes; blunt forms rare.	mostly sharp-pointed amphioxes; blunt forms rare.	mostly sharp-pointed amphioxes; blunt forms rare.	mostly amphistrongyles or blunt amphioxes; sharp forms rare.	sharp-pointed and blunt amphioxes and amphistrongyles; the first named most numerous.	mostly sharp-pointed amphioxes; blunt forms rare.	mostly amphistrongyles or blunt amphioxes; sharp forms rare.	amphistrongyles, blunt and sharp-pointed amphioxes; in some the blunt in others the sharp forms preponderate.	mostly sharp-pointed amphioxes; blunt forms rare.	sharp-pointed amphioxes; blunt amphioxes; amphistrongyles; variously combined.

The *aster-like rhabd-clusters* (Plate **7**, figs. 4–10), which have been found only in var. *cidaris*, are, in my opinion, to be considered as derivates of ordinary rhabds. They appear as smooth oxyasters, composed of from about fifteen to thirty concentric, straight rays fairly uniform in thickness, but differing exceedingly in length, and distributed very irregularly. From four to ten of the rays appear properly developed; these are conical, more rapidly attenuated distally than proximally, and pointed. The other rays are rudimentary, very short, cylindrical, and terminally rounded. These rudimentary rays together form a kind of lobose centrum, from which the longer, pointed rays arise. The rhabd-clusters are 125–180 μ in total diameter. Their rays are 5–8 μ thick and the longest one of the whole cluster is 70–100 μ long.

The *branched amphioxes* (Plate **7**, figs. 1–3) also occurring in this variety, which I consider as transitions between the clusters and the ordinary rhabds, are 410–520 μ long and 9–13 μ thick. They bear from one to four straight branch-rays.

The *microrhabds* (Plate **5**, fig. 27c; Plate **6**, figs. 30–35; Plate **7**, figs. 46–51, 53a, 54a, 55, 56a, 57a, 60a, 61–73, 75a, 79) are for the most part simple, isoactine, gradually or rather abruptly pointed or, more rarely blunt, uniformly curved, and usually slightly centrotyle amphioxes. The tyle, never large, is often so insignificant as to be hardly visible, and many of these spicules seem to have no central thickening at all. In the forms A, B, and C of var. *typica* (Plate **6**, figs. 30–32; Plate **7**, figs. 46, 48–51, 53a, 54a, 55, 56a) nearly all the microrhabds have a distinct central tyle. In the microrhabds of var. *cidaris* (Plate **7**, figs. 75a, 79) the tyle is not so well developed, and in most of the microrhabds of var. *megarhabda* (Plate **6**, figs. 33–35, Plate **7**, figs. 57a, 66–73) and var. *typica*, form D (Plate **7**, fig. 47), the tyle is hardly perceptible or absent altogether. Besides these regular, simple, and isoactine microrhabds a few anisoactine ones, with one actine reduced in length and rounded at the end, and a few with small branch-rays near one end, have been observed in var. *cidaris*, in both forms of var. *megarhabda*, and in form C of var. *typica*. The microrhabds are 30–98 μ long and 1.5–7.5 μ thick. Those of var. *megarhabda* are considerably larger (maximum averages of three 82.3–95.7 by 5.3–6.7 μ) than those of the other two varieties (maximum averages of three 54–61.7 by 3–3.8 and 66.1 by 4.2 μ respectively).

DIMENSIONS AND SHAPES OF MICRORHABDS.

Microrhabds		Erylus rotundus										
		var. megarhabda			var. typica					var. cidaris	
		A	B		A	B	C	D			
		South Molokai	Kauai	limits and means of averages of all the forms of the variety	South Molokai	Kauai, dark specimen	Kauai, light specimen	Northeast Hawaii	limits and means of averages of all the forms of the variety		limits and means of averages of all the forms of the species
Length	limits, μ	45–98	43–86	43–98	35–60	30–55	31–58	46–66	30–66	32–55	30–98
	average of the longest three, μ	95.7	82.3	89	57.7	54	57	61.7	57.6	51	66.1
Thickness	limits, μ	3–7.5	3–5.5	3–7.5	1.5–3.3	1.5–3	2.5–4	2–3.5	1.5–4	2–4.5	1.5–7.5
	average of the thickest three, μ	6.7	5.3	6	3.1	3	3.8	3.3	3.3	4	4.2
Shape		gradually and sharply pointed; central tyle small or absent.	gradually and sharply pointed; usually without central tyle; this when present, small.	gradually and sharply pointed; central tyle small or, more frequently, absent.	rather abruptly and bluntly pointed; centrotyle.	sharply pointed; centrotyle.	abruptly sharply pointed; centrotyle.	gradually and sharply pointed; usually without central tyle.	variously pointed or blunt; central tyle in most, but not in all specimens well developed.	gradually and sharply pointed; more or less centrotyle.	variously pointed, with or without central tyle.

Most of the *triaenes* (Plate 5, figs. 1–5; Plate 6, fig. 27a) are orthotriaenes, some plagiotriaenes. The rhabdome is conical and generally slightly and irregularly curved in an undulating manner. It is 170–370 μ long and, at the cladomal end, 6–12 μ thick. The clades of the same cladome are fairly equal in length. They are usually slightly curved and 80–270 μ long. The breadth of the cladome is 155–440 μ. The triaenes of var. *cidaris* have the broadest, those of var. *megarhabda* the narrowest cladomes. The angle enclosed between the clades and the rhabdome is 90–107°. In form A of var. *megarhabda* I have found a few triaenes with clades either bearing a small branch-ray or abruptly bent down near the end.

DIMENSIONS OF TRIAENES.

Triaenes		*Erylus rotundus*									
		var. megarhabda			var. typica					var. cidaris	limits and means of averages of all the forms of the species
		A	B	limits and means of averages of all the forms of the variety	A	B	C	D	limits and means of averages of all the forms of the variety		
		South Molokai	Kauai		South Molokai	Kauai, dark specimen	Kauai, light specimen	Northeast Hawaii			
Rhabdome	length (limits), µ	170–180	350–370	170–370	200–220		200		200–220	180–190	170–370
	thickness (limits), µ	6–11		6–11	8–12	8	8–9	8	8–12	7–8	6–12
Clade-length (limits), µ		85–180	150–200	85–200	140–225	80–210	150–220	210–250	80–250	80–270	80–270
Cladome breadth	limits, µ	160–290	250–350	160–350	300–360	150–400	250–350	350–390	150–400	300–440	150–440
	average of the broadest three, µ	231	333	282	347	357	310	370	346	397	335
Clade-angle	limits °	92 102		92–102	92–107		90	90	90–107	97–101	90–107
	average °	96.5		96.5	99.5		90	90	93.2	100.5	95.3

The *acanthtylasters* (Plate 6, figs. 14b, 15, 16; Plate 7, figs. 52–54b, 56b, 57b, 58, 59, 75b, 76b) have from two to fourteen concentric, regularly distributed rays. Two-rayed acanthtylasters are rare and have been observed only in var. *cidaris*. Also the three-rayed, which have been found in var. *typica*, form B, var. *megarhabda*, form A, and in var. *cidaris*, are not frequent. Four- to eight-rayed acanthtylasters are abundant in all the forms. Acanthtylasters with more than eight rays appear to be most frequent in var. *typica*, form B, and in var. *megarhabda*, form A. The acanthtylasters measure 12–31 µ in total diameter. Those of var. *cidaris* are somewhat smaller than those of the other two varieties. The size of the acanthtylasters is on the whole in inverse proportion to the number of their rays, those with from two to six rays being 16–31, those with from seven to nine rays 14–24, and those with from ten to fourteen rays 12–19 μ in diameter. The rays are, at the base, 0.5–2.4 μ thick and taper distally. At their ends they are usually thickened to an acanthtyle, rarely simply rounded off. The transverse diameter of the acanthtyle (rounded end) is, inclusive of its spines, 0.5–4 μ. The basal part of the rays is always quite smooth. This smooth part may be quite short, or it may extend right up to the acanthtyle (the rounded, spiny end). Acanthtylasters with rays smooth right up to the acanthtyle have been observed chiefly in var. *typica,* form A. Usually the proximal one to two thirds of the rays are spineless, the remaining distal part being either rough or provided with smaller or larger spines. The larger the spines, the fewer their number. Frequently an increase in the size of the spines towards the end of the ray is noticeable. The acanthtyle is covered with numerous, fairly large spines. Most of the spines appear to be conical and pointed, but in var. *megarhabda*, form A, acanthtylasters with cylindrical spines, rounded at the end, have also been observed. The spines of the acanthtyle are usually somewhat recurved. The proximal spines are usually directed more or less obliquely backward, the distal obliquely upward and outward. On the whole the acanthtyle-spines have the appearance of short hair combed down in all directions from the apex. The spines on the other parts of the rays are vertical or, more rarely, directed obliquely outward.

DIMENSIONS OF ACANTHTYLASTERS.

Acanthtylasters		Erylus rotundus										
		var. megarhabda			var. typica					var. cidaris	
		A	B		A	B	C	D			
		South Molokai	Kauai	all forms	South Molokai	Kauai, dark specimen	Kauai, light specimen	Northeast Hawaii	all forms		all varieties
with two rays	total diameter, μ									24	24
	basal thickness of rays, μ									1.5	1.5
	diameter of acanthtyle (rounded end), μ									3.3	3.3

DIMENSIONS OF ACANTHTYLASTERS (*continued*).

Acanthtylasters		Erylus rotundus									
		var. megarhabda			var. typica					var. cidaris	
		A	B		A	B	C	D			
		South Molokai	Kauai	all forms	South Molokai	Kauai, dark specimen	Kauai, light specimen	Northeast Hawaii	all forms		all varieties
with three rays	total diameter, μ	23		23		23–29			23–29	25–28	23–29
	basal thickness of rays, μ	1.4		1.4		1.2–1.4			1.2–1.4	1.4–1.9	1.2–1.9
	diameter of acanthtyle (rounded end), μ	2.7		2.7		2–2.1			2–2.1	1.6–2.7	1.6–2.7
with four to six rays	total diameter, μ	16–27	16–26	16–27	19–30	17–31	17–23	18–26	17–31	16–26	16–31
	basal thickness of rays, μ	0.8–2	0.8–1	0.8–2	0.7–2	0.8–1.7	0.5–2	1.2–1.5	0.5–2	1–2.4	0.5–2.4
	diameter of acanthtyle (rounded end), μ	1.3–3.5	1.3–1.8	1.3–3.5	1.5–3.5	1.2–2.4	1–4	1.5–2.2	1–4	2–3	1–4
with seven to nine rays	total diameter, μ	16–21	14–23	14–23	15–19	16–24	15–24	17–18	15–24	16–21	14–24
	basal thickness of rays, μ	0.8–1.4	0.7–1.5	0.7–1.5	1.2	0.9–1.3	0.6–1.2	1.2	0.6–1.3	1–1.7	0.6–1.7
	diameter of acanthtyle (rounded end), μ	1–2.3	1.3–2	1–2.3	1.5	1.3–2	0.5–2	1.5	0.5–2	1.5–2.2	0.5–2.3
with ten to fourteen rays	total diameter, μ	13–19	12–17	12–19	12–17	15–19	13–16	16	15–19	13	12–19
	basal thickness of rays, μ	0.6–1.5	0.5–1.2	0.5–1.5	0.6–1.1	0.5–1.3	0.8–1.2	0.7	0.5–1.3	1	0.5–1.5
	diameter of acanthtyle (rounded end), μ	1.2–2.1	1–1.8	1–2.1	1–1.6	0.7–2	1.2–1.8	1.2	0.2–2	1.2	0.7–2.1

It has been stated above, that oxyaster-like spicules similar in size and ray-number to the acanthtylasters, which I consider a young form of the latter, also occur in these sponges. These spicules are rather numerous in var. *megarhabda*, form A, and met with in smaller numbers in var. *megarhabda*, form B, and in the forms A and C of var. *typica*. The distal parts of the rays of these asters are exceedingly slender. Proximally the rays thicken considerably and abruptly, so that their basal part appears bulbous. Besides these spicules, which I consider as the earliest known stages, others similar to them, but with thicker and distally rough rays, representing a later developmental stage, are observed. Finally various asters of this kind occur, in which a more or less pronounced spiny thickening crowns the end of each ray. These asters connect the slender-rayed oxyasters with the true acanthtylasters.

The *small many-rayed oxyasters* (Plate **6**, fig. 14c; Plate **7**, figs. 52c, 60c, 76c) are without centrum or have a slight central thickening, in var. *typica*, form A, up to 4 μ in diameter. There are from eight to twenty-two, or more, usually from fourteen to twenty, equal, concentric, and regularly distributed rays. The rays are, at the base, 0.4–0.9 μ thick and conical, either throughout or only at the end, and then nearly cylindrical in their basal part. They are always sharp pointed and more or less spiny. Sometimes the spines are too small to be discerned as such and their presence is indicated only by a certain roughness of the rays. More often, however, particularly in the larger oxyasters, the spines are large enough to be clearly made out. The larger the spines, the fewer their number. Some of the spines frequently form a verticil some distance below the end of the ray. Oxyasters of this kind were chiefly observed in var. *typica*, form A. The total diameter of the oxyasters is 7–17 μ. Those of var. *typica* are a little smaller than those of the other two varieties. A few asters were observed which appeared as transitions between these oxyasters and the acanthtylasters.

DIAMETERS OF SMALL OXYASTERS.

Small oxyasters (oxysphaerasters) with numerous rays	Erylus rotundus									
	var. megarhabda			var. typica					var. cidaris	all varieties
	A	B		A	B	C	D			
	South Molokai	Kauai	all forms	South Molokai	Kauai, dark specimen	Kauai, light specimen	Northeast Hawaii	all forms		
Total diameter, μ	7.5–11	8–17	7.5–17	10–13	8–14	8–16	7–12	7–16	8–14	7–17

The *aspidasters* (Plate **5**, figs. 27f, 28f; Plate **6**, figs. 17, 18; Plate **7**, figs. 16–30, 42–45; Plate **8**, figs. 13, 14) are broad-oval or circular discs, often with a somewhat irregular outline. This irregularity of outline generally does not exceed that of the aspidasters represented in figs. 18, 19, and 25 on Plate **7**; occasionally, however, quite irregular aspidasters, with one or more deep incisions reaching far into the interior, have been observed in all varieties. The aspidasters are 50–77 μ long, 46–70 μ broad, and 4.4–8.8 μ thick. Those of var. *megarhabda* (50–66 by 46–59 by 4.6–8.8 μ) are smaller than those of the other two varieties. The general average proportion of length to breadth to thickness of the aspidasters of all the forms (varieties) is 100: 93.3: 10.2. The aspidaster-disc is either of uniform thickness throughout, or slightly thickened in the middle. Its margin is simply rounded off. An umbilicus could not be detected. All parts of the surface, the margin as well as the two faces, are covered with protuberances. The largest protuberances are 0.7–2 μ thick and about as high. Most of them bear a terminal verticil of usually from three to seven exceedingly small lateral spines. The large protuberances are usually scattered rather irregularly over the surface. Occasionally some of the protuberances of the central part of the aspidaster lie in straight lines, radiating from the centre of the disc. Between the larger protuberances small ones, just perceptible with the strongest lenses, lie singly or in small groups on the otherwise smooth surface of the disc.

DIMENSIONS OF ADULT ASPIDASTERS.

Aspidasters		Erylus rotundus									
		var. megarhabda			var. typica					var. cidaris	limits and means of averages of all the forms of the species
		A from South Molokai	B from Kauai	limits and means of averages of all the forms of the variety	A from South Molokai	B from Kauai, dark specimen	C from Kauai, light specimen	D from northeast Hawaii	limits and means of averages of all the forms of the variety		
Length	limits, μ	50–62	53–66	50–66	65–77	50–67	60–72	64–70	50–77	65–75	50–77
	average of the three largest, μ	60	64	62	72	63	71	69	68.8	73	67.4
Breadth, limits, μ		46–56	49–59	46–59	54–68	48–61	57–70	61–69	48–70	62–69	46–70
Thickness, limits, μ		6.2–8.8	4.6–5	4.6–8.8	5–7.8	5–6.4	6–6.8	4.4–7.6	4.4–7.8	5–7	4.4–8.8
Average proportion of length to breadth to thickness		100: 91: 12.3	100: 90: 8.2	100: 90.5: 10.3	100: 91: 9.7	100: 94: 11.2	100: 96: 9.8	100: 95: 11.2	100: 94: 10.5	100: 96: 9.2	100: 93.3 10.2
Thickness of protruding rays, μ		0.7–1.6	0.7–1.7	0.7–1.7	1–2	0.8–1	0.7–2	1–1.9	0.7–2	0.7–1	0.7–2

The youngest aspidasters observed were oval or circular discs, about half the size of the adult, and composed of numerous, long, exceedingly slender, perfectly straight rays, lying nearly in the same plane, and radiating from an irregular, lobose structure 2–4 μ in diameter. This lobose centrum is apparently composed of short, terminally rounded concentric rays, arising obliquely to the plane occupied by the long rays. The rays, which in this young stage appear to be isolated throughout, grow in length and in thickness. Their longitudinal growth leads to an increase in the size of the aspidaster, their transverse growth (thickening) to a coalescence of the rays themselves, which, as the growth continues, progresses from the centre towards the margin of the disc. Thus the aggregations of isolated, radial rays become larger, solid discs with serrated margins. This goes on until the spicule has attained nearly its full size. Then the longitudinal growth of the rays ceases, while their lateral growth continues. This leads to a filling up of the serrations and to the formation of smooth discs with more or less continuous margin (Plate **7**, figs. 22, 23). On the whole of the surface, the margin as well as the faces, of the disc, small excrescences then make their appearance, and these grow out to form the protuberances above described.

LOCALITIES AND NATURE OF ENVIRONMENT.

VAR. MEGARHABDA LENDENFELD.

No. of Station	Locality	Date	Depth	Bottom temperature	Bottom	No. of specimens
3849	S. coast of Molokai, Lae-o Ka Laau Light. N. 71°, W. 21.9′.	April 8, 1902	133–78 m. (73–43 f.)	19.8° (67.6° F.)	Coarse sand, broken shells, and corals	2 Form A
3982	Vicinity of Kauai Island, Nawiliwili Light. N. 68°, W. 1.6′.	June 10, 1902	426–73 m. (233–40 f.)	9.2° (48.5° F.)	Coarse brown corals, sand, shells.	1 Form B

VAR. TYPICA LENDENFELD.

No. of Station	Locality	Date	Depth	Bottom temperature	Bottom	No. of specimens
3849	S. coast of Molokai, Lae-o Ka Laau Light. N. 71°, W. 21.9′.	April 8, 1902	133–78 m. (73–43 f.)	19.8° (67.6° F.)	Coarse sand, broken shells, corals	4 Form A
4024	Vicinity of Kauai Island, Mokuaeae Islet. S. 83°, E. 7.6′.	June 23, 1902	44–79 m. (24–43 f.)	23.2° (73.7° F.)	Coarse coral, sand, and Foraminifera	3 Form B
4061	N. E. coast of Hawaii, Kauhola Light. S. 79°, E. 6.7′.	July 18, 1902	44–152 m. (24–83 f.)	—	Corals, sand, coralline nodules, and Foraminifera	1 Form D
4128	Vicinity of Kauai Island, Hanamaulu Warehouse. N. 14° 30′, W. 2.6′.	August 1, 1902	165–327 m. (253–68–90 179 f.)	8.8° (47.8° F.)	Coarse brown coral, sand, and Foraminifera.	1 Form C

VAR. CIDARIS LENDENFELD.

No. of Station	Locality	Date	Depth	Bottom temperature	Bottom	No. of specimens
3849	S. coast of Molokai, Lae-o Ka Laau Light. N. 71°, W. 21.9′.	April 8, 1902	133–78 m (73–43 f.)	19.8° (67.6° F.)	Coarse sand, broken shells, and corals.	1

The thirteen sponges described above obviously form a systematic, though far from a homogeneous, group, the specimens comprising it differing not inconsiderably from each other in several respects. In three specimens the cortical armour is chiefly composed of microrhabds, the aspidasters in it being but few and confined to its external part. In the other ten the cortical armour is composed chiefly of aspidasters, and the microrhabds which take part in its formation are confined to the external part. In the three specimens the microrhabds are considerably larger and the acanthtylasters and aspidasters smaller than in the ten. Among these ten there is one which has smaller oxyasters and relatively thinner aspidasters than the others, and which possesses aster-like rhabd-clusters, a kind of spicule not observed in any of the others. Thus three secondary groups, *megarhabda* (armour chiefly composed of microrhabds, microrhabds large, aspidasters small), *typica* (armour chiefly composed of aspidasters, microrhabds small, aspidasters large, without rhabd-clusters), and *cidaris* (armour chiefly composed of aspidasters, microrhabds small, aspidasters large, with rhabd-clusters) can be distinguished.

Two of the specimens of group *megarhabda*, which come from the south coast of Molokai, are fairly identical, while the third, which comes from the coast of Kauai, has a more grayish colour, smaller rhabd megascleres and microrhabds, considerably larger triaenes, larger oxyasters, and thinner aspidasters. Thus two somewhat different forms (A and B) are contained in the group *megarhabda*.

In five of the nine specimens of group *typica* most of the rhabd megascleres are amphistrongyles or very blunt amphioxes; in the other four most of these spicules are sharp-pointed amphioxes. Four of the five specimens with chiefly amphistrongyle rhabd megascleres, which come from the south coast of Molokai, are fairly identical with each other; the fifth, which comes from the northeast coast of Hawaii, is not like these, massive, lobose, but elongate, digitate in shape, having a much lighter colour, thicker rhabd megascleres, less centrotyle, for the most part simple amphiox microrhabds, somewhat larger euasters and relatively thinner aspidasters. Of the four specimens with chiefly sharp-pointed rhabd megascleres, which all come from the coast of Kauai, three (from Station 4024) are fairly identical, while the fourth (from Station 4128) has a lighter colour, slightly larger microrhabds, much smaller acanthtylasters and longer, considerably broader and thinner aspidasters. Thus four forms (A, B, C, and D) are contained in the group *typica*.

The surroundings of all the different forms of the same group must have been different to a certain extent, since they were found at different stations. For this reason, and because the differences between them are not great and their peculiarities more in the character of individual (somatic) adaptations than of germinal qualities, I think that no greater systematic value than that of local forms, two, A and B, in the group *megarhabda*, and four, A, B, C, and D, in the group *typica*, can be attached to them.

The differences between the groups are much greater, and can hardly be directly due to differences in the surroundings, since specimens belonging to different groups were repeatedly captured together, at one and the same station. This and their general nature lead me to consider the peculiarities, by which these groups differ, not as mere somatic adaptations but as germinal characters. Although most probably germinal in nature and certainly not inconsiderable, these differences are, in my opinion, nevertheless insufficient for more than varietal distinction.

The characters of the three varieties are the following:—

Var. **megarhabda.**

Cortical armour composed chiefly of microrhabds. Rhabd megascleres mostly sharp pointed, blunt forms rare; 330–650 by 6–13 μ. Rhabd-clusters absent. Microrhabds gradually and sharply pointed, central tyle small or absent; 43–98 by 3–7.5 μ. Triaenes; rhabdome 170 370 μ long; cladome 160–350 μ broad. Acanthtylasters with three or more rays; 12–27 μ in diameter. Oxyasters 7.5–17 μ in diameter. Aspidasters 55–66 by 46–59 by 4.6–8.8 μ; average proportion of length to breadth to thickness 100:90.5:10.3.

South coast of Molokai; coast of Kauai.

Var. **typica.**

Cortical armour composed chiefly of aspidasters. Rhabd megascleres sharp pointed or blunt amphioxes, or amphistrongyles; 310–570 by 6–15 μ. Rhabd-clusters absent. Microrhabds variously pointed or blunt, with or without central tyle; 30–66 by 1.5–4 μ. Triaenes; rhabdome 200–220 μ long; cladome 150–400 μ broad. Acanthtylasters with three or more rays; 15–31 μ in diameter. Oxyasters 7–16 μ in diameter. Aspidasters 50–77 by 48–70 by 4.4–7.8 μ; average proportion of length to breadth to thickness 100:94:10.5.

South coast of Molokai; coast of Kauai; northeast coast of Hawaii.

Var. **cidaris.**

Cortical armour composed chiefly of aspidasters. Rhabd megascleres chiefly sharp-pointed amphioxes; 440–650 by 8–12 μ. Rhabd-clusters 125–180 μ long. Microrhabds gradually and sharply pointed, more or less centrotyle; 32–50 by 2–4.5 μ. Triaenes; rhabdome 180–190 μ long; cladome 300–440 μ broad. Acanthtylasters with two or more rays; 12–31 μ in diameter. Oxyasters 8–14 μ in diameter. Aspidasters 65–75 by 62–69 by 5–7 μ; average proportion of length to breadth to thickness 100:96:9.2.

South coast of Molokai.

The structure of the canal-system and spiculation of these sponges clearly show that they belong to Erylus. They differ considerably from all the species of this genus previously described, by the nearly circular shape and the small size of their aspidasters and other characters. Their nearest ally is the species here described as *Erylus caliculatus.* By its shape being caliculate, by its microrhabds being amphistrongyle instead of amphiox, by its aspidasters being larger, relatively much thicker, and partly reniform in shape, and by its spicules generally being larger and much stouter, this sponge differs from *E. rotundus* to such an extent, that it must be considered specifically distinct from it.

Erylus caliculatus, sp. nov.

Plate 5, figs. 6–10, 24, 25–29; Plate 6, figs. 1–13, 19–23, 26, 28, 29; Plate 7, figs. 11–15, 31–41, 74, 77, 78, 80; Plate 8, figs. 1–12, 15–20.

I establish this species for a specimen obtained on the northeast coast of Hawaii (Station 4062). The name refers to its caliculate shape.

Shape and size. The sponge (Plate 5, fig. 29) appears as a broad, low, truncate, inverted cone. It is 33 mm. high. The base of the cone, which forms the upper side of the sponge, is irregularly oval in outline, depressed in the middle, 47 mm. long, and 36 mm. broad. Its elevated margin is rounded, about 6 mm. thick, and partly divided into lobes. The base of attachment, which corresponds to the truncate summit of the cone, measures 30 by 18 mm. The surface is uneven and covered with shallow grooves, 0.5–1 mm. broad. These grooves are particularly well marked on the protruding marginal lobes. Numerous small circular pores, up to 0.3 mm. in diameter, are scattered over the sides of the sponge. Apertures occur also on its depressed upper face, but these are not so numerous and less uniform in size than those on the sides. The largest of these apical apertures, which I am inclined to consider as oscules, measure 1 mm. in diameter. The margin is free from pores.

The *colour* of the sponge (in spirit) is dirty white.

The superficial part of the body is differentiated to form a *cortex* which contains an aspidaster-armour and is about 65 μ thick.

Canal-system. The, probably efferent, apertures on the depressed, terminal face of the sponge are surrounded by sphincter-membranes. The flagellate chambers (Plate 6, figs. 28, 29) are more or less spherical and 15–22 μ in diameter.

The *skeleton* consists of rhabd megascleres, microrhabds, triaenes, acanthtylasters, slender-rayed oxyasters, small oxysphaerasters, and aspidasters. Some of the rhabd megascleres form bundles (Plate 6, fig. 26a), others are isolated and scattered. The bundles extend from the base upward and outward; on nearing the surface they curve, where necessary, so as to abut steeply or vertically on the cortex. The cladomes of the triaenes extend paratangentially just below the cortical armour, their rhabdomes being directed radially inwards. The triaenes occupy the interporal spaces (Plate 6, fig. 23) and often form well-defined groups at the intersections of the interporal zones. The microrhabds form a thin superficial layer overlying the aspidaster-armour and occupy the mantles surrounding the cortical canals, chiefly their outer parts farthest from the lumen. A few microrhabds are also found scattered in the choanosome. The acanthtylasters and the slender-rayed oxyasters, which latter I consider as young acanthtylasters, are numerous in all parts of the choanosome and extend right up to the cortex and even into the mantles of the cortical canals. The small oxysphaerasters are confined to the subcortical region and the mantles of the cortical canals, on the inner surface of which they are often quite numerous. The aspidasters occupy the proximal and middle parts of the cortical armour in dense masses, leaving only the mantles of the cortical canals free. Some aspidasters also occur scattered in the choanosome. The aspidasters in the armour are mostly situated paratangentially. Next the mantles of the cortical canals, however, they often assume other positions.

Most of the *rhabd megascleres* (Plate 5, figs. 24, 25) are very blunt amphioxes (Plate 5, figs. 24a, 25a), many indeed so blunt that they can be considered as amphistrongyles. A few blunt styles (Plate 5, fig. 24c) and branched rhabd, derivates have also been observed. Most of the rhabds are more or less curved, usually more strongly in their central part than at their ends. The rhabds are 410–850 μ long and 10–19 μ thick, the average measurements of the three longest and thickest being 723 by 18 μ.

The *microrhabds* (Plate 6, figs. 1, 2, 4a, 5a; Plate 7, figs. 74a, 77a, 78, 80) are centrotyle amphistrongyles, usually more or less attenuated towards the rounded ends. They are generally slightly curved, the curvature being uniform or, rarely, greater near the ends than in the middle. Most of these spicules are isoactine, anisoactine forms with one actine reduced in length being met with only exceptionally. The microrhabds are 39–52 μ long and, near the middle, close to the tyle, 3–5 μ thick, the average measurements of the three longest and thickest being 51 by 4.8 μ. The tyle is 0.3–1 μ more in transverse diameter than the adjacent parts of the spicule.

Besides these regular microrhabds, branched microrhabd-derivates have been observed in small numbers. In these spicules two or, rarely, more, short, terminally rounded or, exceptionally, pointed branch-rays arise from a point a little below one end of the spicule. In one of these spicules such branch-rays were observed at both ends. When there are two branch-rays they usually stand opposite each other in a straight line which intersects the axis of the spicule at an angle of 40 to 60°.

The *triaenes* (Plate **5**, figs. 6–10; Plate **6**, fig. 23) are orthotriaenes. Their rhabdome is straight, conical, 200–300 μ long, and, at the cladomal end, 13–20 μ thick. The clades are 125–220 μ long, usually simple, and slightly and irregularly curved. Rarely one clade bears a short branch-ray. The clades enclose angles of 87–98° with the rhabdome. The breadth of the cladome is 210–380 μ.

The *acanthtylasters* (Plate **6**, figs. 4b, 5b, 6–13, 29; Plate **7**, figs. 74, 77b; Plate **8**, figs. 2–12) usually have from four to eight, rarely only two or three, concentric and regularly or, more rarely, irregularly distributed rays. The rays are equal or one or more of them reduced in length. The properly developed rays are, at the base, 1.5–4.5 μ thick and taper towards the distal end, which is usually crowned by an acanthtyle, rarely simply rounded off. The acanthtyle or rounded end is 1–5 μ in transverse diameter. The basal part of the rays is either quite smooth or bears a few spines; from their central and distal parts a good many spines arise. The acanthtyle (rounded end) is densely covered with spines. The spines are usually conical, sharp pointed, and of considerable size. The largest one observed was 1.5 μ long. The spines arising from the acanthtyle (rounded end) are generally very markedly recurved and in their position resemble short flexible hair combed down in all directions from the apex of the acanthtyle (rounded end). Those arising from the rays farther down are either vertical or directed obliquely outward or inward. The total diameter of the acanthtylasters is 17–50 μ. This dimension and also the size of the rays and acanthtyles are, on the whole, in inverse proportion to the ray-number. This proportional correlation is, however, not a uniformly regular one, for while the three- to five-rayed acanthtylasters and their parts are nearly equal in size, and the same applies to the seven- and eight-rayed ones, there are considerable dimensional differences between the two- and three-rayed, the five- and six-rayed, and six- and seven-rayed ones. In a curve representing this correlation two steep, step-like falls would interrupt the general descent. The dimensions of the two-rayed, three- to five-rayed, six-rayed, and seven- to eight-rayed acanthtylasters are tabulated below.

ACANTHTYLASTERS.

Ray-number	2	3–5	6	7–8
Total diameter, μ	50	23–39	19–34	17–23
Basal thickness of rays, μ	3	2–4.5	1.5–3.5	1.5–2.5
Transverse diameter of acanthtyle (rounded end), μ	4.5	2–5	1–1.3	1–2.5

Many oxyasters, similar in diameter and ray-number to the acanthtylasters, occur in the choanosome. The rays of these spicules are quite slender in their distal part but usually thickened in a very marked manner at their base. Similar spicules with slightly thicker, rough rays, and others with still thicker and rougher rays and a slight terminal thickening, connect the oxyasters with the acanthtylasters. I consider the former as young stages of the latter.

The *small oxysphaerasters* (Plate 6, fig. 3; Plate 7, figs. 11–15, 74c) have a spherical centrum, 4–5.5 μ in diameter, from which from ten to twenty or more equal, concentric, regularly distributed, conical, blunt or sharp-pointed rays arise. The rays are, at the base, 0.7–1.4 μ thick, and smooth. Their middle and distal parts are covered with small spines. Occasionally a few spines, larger than the rest, form a loose verticil some distance from the end of the ray. The whole aster is 9–18 μ in diameter. A correlation (inverse proportion) between size and ray-number is not discernible.

The *aspidasters* (Plate 6, figs. 19–22; Plate 7, figs. 31–41; Plate 8, figs. 1, 15–20) are discs varying from broad-oval to circular or reniform. Very rarely aspidasters quite irregular in outline, with several deep incisions, have been observed. The broad-oval to circular aspidasters (Plate 6, figs. 19, 20; Plate 7, figs. 31–37), which are much more numerous than the reniform ones, are fairly regular in outline, 72–88 μ long, 67–77 μ broad, and 10.6–12.8 μ thick. The average proportion of length to breadth to thickness is 100:95:15. In the reniform aspidasters (Plate 6, figs. 21, 22; Plate 7, figs. 38–41), which are otherwise similar to the broad-oval to circular ones, the margin is incised at a point usually lying on one of the broader sides. This incision may be quite insignificant (Plate 7, fig. 39) or it may extend far into the interior of the spicule (Plate 6, fig. 21). The reniform aspidasters have similar dimensions to the broad-oval or circular ones, but are somewhat narrower, some not more than 63 μ broad. The surface of the adult aspidaster is covered with short, truncate, protruding rays, 1.8–4 μ thick. These rays bear terminal verticils of lateral spines, and usually also some spines arise from their apical faces. The number of protruding rays is very variable. On some aspidasters (Plate 6, fig. 20; Plate 7, figs. 32–35, 38–40; Plate 8, figs. 15, 16) they are few and far between, in others (Plate 6, fig. 19; Plate 7, figs. 36, 37, 41; Plate 8, figs. 17–20) very numerous and, although usually distributed rather irregularly, nowhere very far apart.

The youngest stages of the aspidasters (Plate 7, fig. 31; Plate 8, fig. 1) appear as discs composed of slender rays radiating from a common centre. The great majority of these rays are as long as the radius of the disc, lie nearly in one plane, and extend from the centre to the margin of the disc. A few are much shorter, and these are situated obliquely to the plane of the disc occupied by the long rays (Plate 8, fig. 1). These ray-aggregations grow in the same way as in *Erylus rotundus*, described in detail, p. 306, and become smooth discs (Plate 6, fig. 22), on the surface of which protruding rays later make their appearance. It seems, *a priori*, probable that the aspidasters with few protuberances (Plate 6, fig. 20; Plate 7, figs. 32–35, 38–40; Plate 8, figs. 15, 16) are young forms which later, by the accession of further protuberances, are converted into the aspidasters with numerous protruding rays (Plate 6, fig. 19; Plate 7, figs. 36, 37, 41; Plate 8, figs. 17–20). Since, however, the protruding rays of the aspidasters with but few of them seem to be on the whole larger than those of the aspidasters with many of them, this is somewhat doubtful.

This sponge was caught with the tangles on the northeast coast of Hawaii, Station 4062, Kauhola Light, S. 69° 15′, E. 6.9′ on July 18, 1902; depth 152–206 m. (83–113 f.); it grew on a bottom of coral, volcanic sand, shells, and Foraminifera.

The structure of the canal-system and the spiculation of this sponge clearly show that it belongs to Erylus. From all the species of this genus previously described it differs considerably by the partly broad-oval to circular, partly reniform shape, and the small size of its aspidasters. It is nearest allied to *Erylus rotundus*. From this *E. caliculatus* is distinguished by the shape, which is massive lobose to digitate in *E. rotundus* and caliculate in *E. caliculatus;* by the microrhabds, which are amphiox in the former and amphistrongyle in the latter; by the aspidasters which are absolutely smaller, relatively thinner, and oval or circular in *E. rotundus* and absolutely larger, relatively thicker, and in part also reniform in *E. caliculatus;* and by the spicules generally which are smaller and much less robust in *E. rotundus* than in *E. caliculatus*.

II. GENERAL SYSTEMATIC ACCOUNT OF THE GENERA, SPECIES, AND VARIETIES FROM THE PACIFIC OCEAN.

Erylidae.

Tetraxonida with rhabd and teloclade megascleres, and a superficial armour composed of aspidasters and microrhabds. Euasters are always present in the choanosome.

For the present I place only one genus, Erylus, in this family.

ERYLUS Gray.

With uniporal afferents and uniporal efferents or larger oscules. Without ana- or protriaenes.

Twenty-two species are known. Eight of these occur in the Pacific Ocean.

SUMMARY OF THE SPECIES FOUND IN THE PACIFIC OCEAN.

A_1 The large choanosomal euasters are oxyasters.

A_2 The teloclades are orthoplagiotriaenes.

A_3 The microrhabds have pointed ends.

E. placenta Thiele. E. monticularis Kirkpatrick.

B_3 The microrhabds are amphistrongyle centrotyles.

E. decumbens Lindgren.

B_2 The teloclades are chiefly dichotriaenes.

E. oxyaster Lendenfeld.

B_1 The large choanosomal euasters are acanthtylasters.

A_2 The aspidasters are about twice as long as broad.

E. nobilis Thiele. E. sollasii Lendenfeld.

B_2 The aspidasters are nearly as broad as long.

E. rotundus Lendenfeld, var. megarhabda Lendenfeld, var. typica Lendenfeld, var. cidaris Lendenfeld. E. caliculatus Lendenfeld.

Erylus placenta Thiele.

Zoologica, 1898, **24**, p. 5, plate 1, fig. 1; plate 6, fig. 1 a–h. Lendenfeld, Tierreich, 1903, **19**, p. 87.

Incrusting, 2–3 mm. thick. In spirit: reddish gray.

Amphioxes: mostly 700–800 by about 15 μ; sometimes much shorter, only half as long. *Orthotriaenes*: rhabdome 500, clades 270 μ long.

Microrhabds: slightly curved, abruptly pointed centrotyle amphioxes; 25–50 μ long. *Oxyasters*: three to six, most frequently four rays; each ray 20–30 μ long. *Oxysphaerasters*: centrum about 5, whole aster 10 μ in diameter. *Aspidasters*: oval, very frequently with incised margin, irregular; 170–200 by 80–90 by 18 μ.

Northwestern Pacific. Japan: Kagoshima Bay.

Erylus monticularis Kirkpatrick.

Ann. mag. nat. hist., 1900, ser. 7, **6**, p. 351, plate 14, fig. 3 a–h.

Thin, incrusting. Pale brown.

Amphioxes: 210 by 10 μ. *Orthotriaenes*, rhabdome 6 μ thick; clades 186 μ long.

Microrhabds: amphiox; 40–80 by 1–3 μ. *Oxyasters*: about 6 rays; total diameter 18–30 μ. *Small tylasters* (chiasters, Kirkpatrick): with small centrum; about 12 rays; total diameter 10 μ. *Aspidasters*: 150 μ long, 114 μ broad.

Central Pacific. Funafuti Islet.

Erylus decumbens Lindgren.

Zool. anz. 1897, **20**, p. 485. Zool. jahrb. Syst., 1898, **11**, p. 338, plate 20, fig. 1.
Erylus euastrum (Schmidt) Lendenfeld, Tierreich, 1903, **19**. p. 86.

Incrusting, 3 mm. high. Surface black, interior gray.

Amphioxes: one end often blunt, 0.8 mm. by 24 μ. *Orthoplagiotriaenes*: rhabdome 420 by 28 μ; clades curved, concave to rhabdome, 280 μ long; clade-angles nearly 90° (according to text), 104° (according to figure).

Microrhabds: curved, centrotyle amphistrongyles, 60 by 6 μ. *Oxyasters*: two to five smooth rays; each ray 24 μ long. *Sphaerasters*: numerous rays; total diameter 10 μ. *Aspidasters*: oval, some with incisions; 182 by 120 by 28 μ.

Formerly I was inclined (*loc. cit.*) to consider this species as identical with *Stelletta euastrum* Schmidt (1868) and *Erylus cylindrigerus* Ridley (1884), but the reexamination has made me doubtful on this point, so that I now revert to Lindgren's name.

Western Pacific: Java.

Erylus oxyaster Lendenfeld.

Ante, p. 268.

Massive with lobose or digitate protuberances. In spirit: brown, part of the surface lighter than the rest.

Amphioxes: pointed, rarely blunt: 1.8–2.9 mm. by 60–85 μ. *Styles*: rare; 1.9–2.3 mm. by 60–105 μ. *Angularly bent and branched rhabd-derivates*: in dimensions similar to the amphioxes, rare. *Plagiotriaenes*: rare; rhabdome 0.9 mm. by 75–90 μ; clades 0.7 mm. long; clade-angles 109–112°. *Dichotriaenes*: rhabdome 0.6–1.6 mm. by 70–105 μ; main clades 250–400, end clades 40–450 μ long; clade-angles 109–120°. *Irregular dichotriaene-derivates*: with the clades reduced in number or the rhabdome reduced in length; rare.

Microrhabds: more or less curved, centrotyle, generally isoactine amphistrongyles; 31–47, rarely up to 93 μ long, 3.5–4.5 μ thick. *Oxyasters*: usually with a slight central thickening; one to twenty or more perfectly smooth, conical rays; total diameter 10–90 μ. *Aspidasters*: oval, rarely roundish or irregular; the ordinary oval ones 208–243 by 125–150 by 30–40 μ.

Eastern Pacific. Galapagos Islands: 0° 50′ S., 89° 36′ W. "Albatross" Station 2809.

Erylus nobilis Thiele.

Abhandl. Senckenb. gesellsch., 1900, **25**, p. 48, plate 2, fig. 17. Lendenfeld, Tierreich, 1903, **19**, p. 85.

Irregularly cylindrical. White; in the interior brownish.

Amphioxes: rather abruptly pointed; nearly 1 mm. by 30 μ. *Orthotriaenes*: rhabdome 600 by 40 μ; clades 250 μ long, slightly curved.

Microrhabds: centrotyle amphistrongyles; about 48 by 6 μ. *Acanthtylasters*: most frequently seven rays; each ray 20 μ long. *Aspidasters*: oval, outline sometimes irregular; 190 by 90–100 by 40 μ.

Western Pacific. Ternate.

Erylus sollasii Lendenfeld.

Ante, p. 272.

Irregularly massive, with lobose, gyriform, or short digitate processes. In spirit: whitish to chestnut-brown or purplish brown; one part of the surface sometimes darker than the rest.

Blunt amphioxes: 425–980 by 8–24 μ. *Sharp-pointed amphioxes, amphistrongyles, and styles* of similar dimension; rare. *Orthoplagiotriaenes*: rhabdome

140–520 by 8–22 μ, rarely reduced in length and thickened; cladomes very polymorphic; clades simple or bifurcate; simple clades 120–300 μ long; bifurcate clades, main clades 70–270, end clades 10–160 μ long; clade-angles 86–116°; in some specimens all the triaene-clades are simple, in some the majority are simple, the minority bifurcate, in some the majority are bifurcate.

Microrhabds: curved, centrotyle, pointed; 30–78 by 2.5–5 μ. *Anisoactine and branched microrhabd-derivates*: of similar dimensions; rare. *Acanthtylasters*: two to fourteen or more rays; total diameter 10–38 μ. *Aspidasters*: oval, rounded rhomboidal, or irregular with lobose marginal protuberances; 95–156 by 55–82 by 7.4–14 μ.

Central Pacific. Hawaiian Islands: south coast of Molokai. "Albatross" Stations 3847, 3848, 3849; northeast coast of Hawaii. "Albatross" Stations 4055, 4062.

Erylus rotundus Lendenfeld.

Ante, p. 290.

Massive, oval or somewhat irregular, with lobose, gyriform, or digitate protuberances. Surface usually more or less rugose. In spirit: dirty white to light brown in the interior; surface dirty white to purplish brown or purplish gray or purplish black, one part of the surface often much darker than the rest. Sometimes with whitish spots, marking the position of the pores, on the darker parts of the surface.

Rhabd megascleres: sharp-pointed amphioxes, blunt amphioxes, or amphistrongyles, variously combined, 310–650 by 6–15 μ. *Styles, angularly bent and branch-bearing rhabd-derivates*: of similar dimensions; rare. *Aster-like rhabd-clusters*: four to ten conical, irregularly distributed, longer, and a number of very short rudimentary, cylindrical, terminally rounded rays; total diameter 125–180 μ; only in variety *cidaris*. *Orthoplagiotriaenes*: rhabdome 170–370 by 6–12 μ; clades often slightly, irregularly curved; 80–270 μ long; clade-angles 90–107°.

Microrhabds: slightly curved, variously but generally sharply pointed; 30–98 by 1.5–7.5 μ; with or without central tyle, the latter when present small. *Acanthtylasters*: two to fourteen rays; total diameter 12–31 μ. *Small oxyasters*: eight to twenty-two or more, conical, spined rays; total diameter 7–17 μ. *Aspidasters*: broad oval to circular; 50–77 by 46–70 by 4.4–8.8 μ.

Central Pacific. Hawaiian Islands: south coast of Molokai. "Albatross" Station 3849; coast of Kauai. "Albatross" Stations 3982, 4024, 4128; northeast coast of Hawaii. "Albatross" Station 4061.

Erylus rotundus var. megarhabda Lendenfeld.

Ante, p. 309.

Cortical armour composed chiefly of microrhabds. *Rhabd megascleres*: mostly sharp pointed; blunt forms rare; 330–650 by 6–13 μ. *Rhabd-clusters* absent. *Orthoplagiotriaenes*: rhabdome 170–370 μ long; cladome 160–350 μ broad. *Microrhabds*: gradually and sharply pointed; 43–98 by 3–7.5 μ; central tyle small or absent. *Acanthtylasters* with three or more rays; 12–27 μ in diameter. *Small oxyasters*: 7.5–17 μ in diameter. *Aspidasters*: 55–66 by 46–59 by 4.6–8.8 μ.

Central Pacific. Hawaiian Islands: south coast of Molokai. "Albatross" Station 3849; coast of Kauai. "Albatross" Station 3982.

Erylus rotundus var. typica Lendenfeld.

Ante, p. 309.

Cortical armour composed chiefly of aspidasters. *Rhabd megascleres*: sharp pointed or blunt amphioxes, or amphistrongyles; 310–570 by 6–15 μ. *Rhabd-clusters*: absent. *Triaenes*: rhabdome 200–220 μ long, cladome 150–400 μ broad. *Microrhabds*: variously pointed or blunt, with or without central tyle; 30–66 by 1.5–4 μ. *Acanthtylasters*: with three or more rays; 15–31 μ in diameter. *Oxyasters*: 7–16 μ in diameter. *Aspidasters*: 50–77 by 48–70 by 4.4–7.8 μ.

Central Pacific. Hawaiian Islands: south coast of Molokai. "Albatross" Station 3849; coast of Kauai. "Albatross" Stations 4024, 4128; northeast coast of Hawaii. "Albatross" Station 4061.

Erylus rotundus var. cidaris Lendenfeld.

Ante, p. 310.

Cortical armour composed chiefly of aspidasters. *Rhabd megascleres*: chiefly sharp-pointed amphioxes; 440–650 by 8–12 μ. *Rhabd-clusters*: 125–180 μ long. *Triaenes*: rhabdome 180–190 μ long, cladome 300–440 μ broad. *Microrhabds*: gradually and sharply pointed, more or less centrotyle; 32–50 by 2–4.5 μ. *Acanthtylasters*: with two or more rays; 12–31 μ in diameter. *Small oxyasters*: 8–14 μ in diameter. *Aspidasters*: 65–75 by 62–69 by 5–7 μ.

Central Pacific. Hawaiian Islands: south coast of Molokai. "Albatross" Station 3849.

Erylus caliculatus Lendenfeld.

Ante, p. 310.

Inverted conical, caliculate. In spirit: dirty white.

Blunt amphioxes and amphistrongyles: 410–850 by 10–19 μ. *Orthotriaenes*: rhabdome 200–300 by 13–20 μ; clades 125–220 μ long; clade-angles 87–98°.

Microrhabds: centrotyle amphistrongyles, usually attenuated towards the ends; 39–52 by 3–5 μ. *Acanthtylasters*: usually four to eight, rarely only two or three rays; total diameter 17–50 μ. *Small oxysphaerasters*: ten to twenty or more rays; centrum 4–5.5, whole aster 9–18 μ in diameter. *Aspidasters*: broad-oval to circular, or, not so frequently, reniform; the broad-oval to circular ones 72–88 by 67–77 by 10.6–12.8 μ; the reniform ones often narrower.

Central Pacific. Hawaiian Islands: northeast coast of Hawaii. "Albatross" Station 4062.

III. DISTRIBUTION.

If the fauna of the Pacific so far as it relates to the Erylidae is compared with that of other regions, it is seen that its single genus Erylus occurs in both. Some of the Pacific species are similar to species found outside the Pacific, but not a single one appears to be really identical with any ultra-Pacific one.

Eight of the twenty-two known species, that is 36 %, occur in the Pacific.

The range of the Pacific species is, so far as at present known, not great. With the exception of *Erylus rotundus* and *E. sollasii*, which have been obtained at various points on the coasts of the Hawaiian Islands, all the Pacific species are recorded from one locality only.

The majority of species, the Pacific as well as those of other regions, are tropical or subtropical. It is remarkable that no specimen of Erylus has hitherto been found on the west coast of the American continent.

The horizontal distribution of the Pacific species is:—

Eastern Pacific Islands.

Erylus oxyaster.	Galapagos.

Central Pacific Islands.

Erylus monticularis.	Funafuti.
" sollasii.	Hawaiian Islands.
" rotundus.	" "
" caliculatus.	" "

Southeastern Asiatic Islands.

Erylus decumbens.	Java.
" nobilis.	Ternate.

Northeastern Asiatic Islands.

Erylus placenta.	Japan.

All the Pacific species have been found in rather shallow water.

IV. LIST OF STATIONS.

Station	Locality	Lat.	Long.	Date	Depth in fathoms	Surface temperature, Fahr.	Bottom temperature, Fahr.	Bottom	Instruments used
		° ′ ″	° ′ ″						
2809	Galapagos Islands	S. 00 50 00	W. 89 36 00	April 4, 1888	45	79°	74.1°	Gray sand	Small beam trawl
3847	S. coast of Molokai, Lae-o Ka Laau Light	N.64 30 00	W. 23 00 00	April 8, 1902	23–24	76		Sand and stones	Hand lead, 6 foot hemp tangles
3848	S. coast of Molokai, Lae-o Ka Laau Light	N.68 15 00	W. 22 4 00	" " "	44–73	76	71.1	Sand and gravel	Sigsbee sounding machine, surface tow net, 5½ foot Blake beam trawl, etc.
3849	S. coast of Molokai, Lae-o Ka Laau Light	N.71 00 00	W. 21 09 00	" " "	73–43	76	67.6	Coarse sand, broken shells, and corals	Tanner sounding machine, 10 foot Blake beam trawl, surface tow net
3982	Vicinity of Kauai Island, Nawiliwili Light	N.68 00 00	W. 01 06 00	June 10, 1902	233–40	78	48.5	Coarse brown corals, sand, shells	Sigsbee sounding machine, 9 foot hemp tangles
4024	Vicinity of Kauai Island, Mokuaeae Islet	S.83 00 00	E. 07 06 00	June 23, 1902	24–43	75	73.7	Coarse coral, sand, and Foraminifera	Sigsbee sounding machine, 9 foot hemp tangles
4055	N. E. coast of Hawaii, Alia Point Light, Hilo Bay	N.20 00 00	W. 03 05 00	July 16, 1902	50–62	76		Fine gray sand, and Foraminifera	Tanner sounding machine, 8 foot hemp tangles
4061	N. E. coast of Hawaii, Kauhola Light	S. 79 00 00	E. 06 07 00	July 18, 1902	24–83	77		Corals, sand, coralline nodules, and Foraminifera	Tanner sounding machine, 8 foot hemp tangles
4062	N. E. coast of Hawaii, Kauhola Light	S. 69 15 00	E. 06 09 00	" " "	83–113	77		Coral, volcanic sand, shells, and Foraminifera	Tanner sounding machine, 8 foot hemp tangles
4128	Vicinity of Kauai Island, Hanamaulu Warehouse	N.44 30 00	W. 02 06 00	Aug. 1, 1902	253–68–90–179	77	47.8	Coarse brown coral, sand, and Foraminifera	Sigsbee sounding machine, 8 foot Albatross pattern Blake beam trawl

EXPLANATION OF THE PLATES.

PLATE 1.

Erylus sollasii Lendenfeld.

Figures 1–48.

1.— Transverse section of a lamellar part of a large dark specimen from South Molokai (race II); magnified 7.5; phot. Zeiss, planar 50 mm.:
  a, cortex; b, choanosome; c, monaxonid symbiont attached to one side of the Erylus.

2.— Part of the surface of a large whitish specimen from South Molokai (race I, form C); magnified 7.5; phot. Zeiss, planar 50 mm.

3.— Subcortical portion of a radial section occupied by numerous large spherical granular cells, of a large dark specimen from South Molokai (race II); haematoxylin; magnified 200; phot. Zeiss, apochr. 8, compens. oc. 6.

4.— Part of a radial section through the choanosome of a large dark specimen from South Molokai (race II); haematoxylin; magnified 200; phot. Zeiss. apochr. 8, compens. oc. 6.

5-12.— Apical views of cladomes of triaenes; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
  5, of a triaene with one simple and two bifurcate clades of a large dark specimen from South Molokai (race II);
  6, of a regular dichotriaene with very short end clades of a large dark specimen from South Molokai (race II);
  7, of a regular plagiotriaene of a large dark specimen from South Molokai (race II);
  8, of an irregular dichotriaene-derivate in which one end clade of each of the three pairs is reduced, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);
  9, of a regular dichotriaene with long end clades of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);
  10, of a triaene with one trifurcate and two bifurcate clades of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);
  11, of a regular plagiotriaene of a large whitish specimen from South Molokai (race I, form C);
  12, of a regular plagiotriaene of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D).

13–26.— Side views of triaenes; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
  13, of a regular plagiotriaene with a rhabdome reduced to a short, conical protuberance, of a large dark specimen from South Molokai (race II);
  14, of a triaene with one bifurcate and two simple clades, and a rhabdome reduced to a short, conical protuberance, of a large dark specimen from South Molokai (race II);
  15, of a plagiotriaene with simple, unequal, stout, blunt clades and a regular blunt rhabdome, of a large whitish specimen from South Molokai (race I, form C);
  16, of a plagiotriaene with equal, cylindrical, terminally rounded clades and a rhabdome bearing small rounded protuberances near the end, of a large whitish specimen from South Molokai (race I, form C);
  17, of a plagiotriaene with slightly unequal, slender, blunt clades and a regular pointed rhabdome, of a large whitish specimen from South Molokai (race I, form C);
  18, of an irregular orthotriaene with unequal stout clades partly rounded at the end, and a reduced cylindrical, terminally rounded rhabdome, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);
  19, of a plagiotriaene with fairly equal, slender, pointed, regular clades and a fairly pointed rhabdome, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);
  20, of a plagiotriaene with slender, regular clades, one of which is strongly curved at the end, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);
  21, of a fairly regular plagiotriaene with short pointed clades, of a large dark specimen from South Molokai (race II);
  22, of a triaene with one bifurcate clade, of a large dark specimen from South Molokai (race II);
  23, of a protriaene with unequal, cylindrical clades, reduced in length and terminally rounded, of a large dark specimen from South Molokai (race II);
  24, of a plagiotriaene with one clade terminally recurved and a rhabdome bearing slight protuberances near the end, of a large dark specimen from South Molokai (race II);
  25, of a rather stout plagiotriaene with relatively long clades, of a large dark specimen from South Molokai (race II);

26, of a slender plagiotriaene with relatively long clades of a large dark specimen from South Molokai (race II).

27.— A large whitish specimen from South Molokai (race I, form C); natural size; phot. Zeiss, anastig. 480/412 mm.

28.— A large dark specimen from South Molokai (race II); natural size; phot. Zeiss, anastig. 480/421 mm.

29–35.— Rhabd megascleres; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:

29–31, more or less amphiox-rhabds tapering towards both ends, of a large whitish specimen from South Molokai (race I, form C);

32, stout and short, somewhat irregularly cylindrical amphistrongyle, of a large whitish specimen from South Molokai (race I, form C);

33, 34, sharp-pointed amphioxes, of a small dark specimen from South Molokai (race I, form B);

35, pointed amphiox of a large dark specimen from South Molokai (race II).

36–41.— Groups of microscleres from centrifuge-spicule preparations; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6:

a, isoactine centrotyle microrhabds; b, anisoactine microrhabds; c, acanthtylasters; d, young aspidaster;

36, 39, 41, of a large whitish specimen from South Molokai (race I, form C);

37, of a small dark specimen from South Molokai (race I, form B);

38, of a large dark specimen from South Molokai (race II);

40, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D).

42–48.— Rhabd megascleres; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:

42, 43, large, more or less pointed amphioxes, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);

44, style, abruptly bent close to the blunt end, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);

45, amphistrongyle, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);

46, small blunt amphiox, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);

47, 48, small, sharp-pointed amphiox, of a small, partly light, partly dark, specimen from South Molokai (race I, form A).

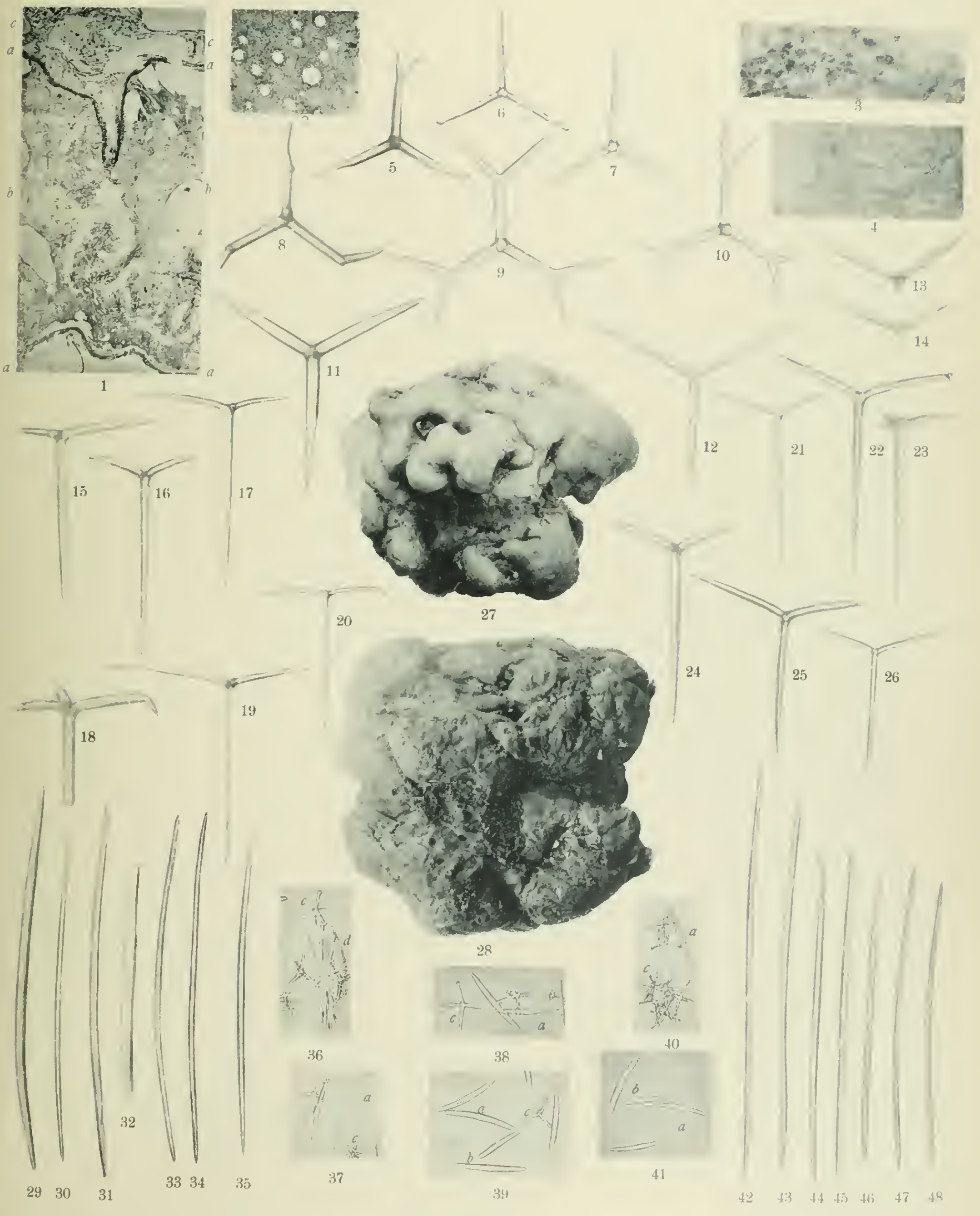

Fig. 1-48 Erylus sollasii n. sp.
1, 3-7, 13, 14, 21-26, 28, 35, 38 race II; 2, 11, 15-17, 27, 29-32, 36, 39, 41 race I form C; 8-10, 12, 18-20, 40, 42-46 race I, form D; 33, 34, 37 race I, form B; 47, 48 race I, form A.

PLATE 2.

PLATE 2.

Erylus sollasii LENDENFELD.

Figures 1–26.

1, 2.— A large acanthtylaster of a large dark specimen from South Molokai (race II); magnified 1800; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

1, focused higher; 2, focused lower.

3, 4.— Group of acanthtylasters from a centrifuge-spicule preparation; magnified 540; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10:

3, of a large whitish specimen from South Molokai (race I, form C);

4, of a large dark specimen from South Molokai (race II).

5-7.— The central part of an aspidaster of a large dark specimen from South Molokai (race II); magnified 1800; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

5, focused high (on the upper surface); 6, focused intermediate; 7, focused low (on the centrum).

8, 9.— A large acanthtylaster of a large dark specimen from South Molokai (race II); magnified 1800; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

8, focused higher; 9, focused lower.

10, 11.— A small acanthtylaster of a large dark specimen from South Molokai (race II); magnified 1800; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

10, focused lower; 11, focused higher.

12–15.— Aspidasters; magnified 540; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

12, somewhat irregular adult aspidaster, of a large whitish specimen from South Molokai (race I, form C);

13, regular, oval adult aspidaster, of a large dark specimen from South Molokai (race II);

14, very young aspidaster composed of radiating rays, of a large dark specimen from South Molokai (race II);

15, elongate, young, perfectly smooth aspidaster, of a large dark specimen from South Molokai (race II).

16.— Group of isoactine microrhabds, of a large dark specimen from South Molokai (race II); magnified 540; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10.

17.— Isoactine microrhabd, of a large whitish specimen from South Molokai (race I, form C); magnified 540; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10.

18.— Isoactine microrhabd, of a large dark specimen from South Molokai (race II); magnified 1800; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10.

19–26.— Aspidasters; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6:

19, young aspidaster, of a small, partly light, partly dark, specimen from South Molokai (race I, form A);

20, young aspidaster, of a large whitish specimen from South Molokai (race I, form C);

21, young aspidaster, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);

22, adult, lozenge-shaped aspidaster, of a small, partly light, partly dark, specimen from South Molokai (race I, form A);

23, adult, oval aspidaster, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D);

24, adult, irregular aspidaster, of a small, partly light, partly dark, specimen from South Molokai (race I, form A);

25, adult, irregular aspidaster, of a large whitish specimen from South Molokai (race I, form C);

26, adult, broad oval aspidaster, of a middle-sized light-coloured specimen from northeast Hawaii (race I, form D).

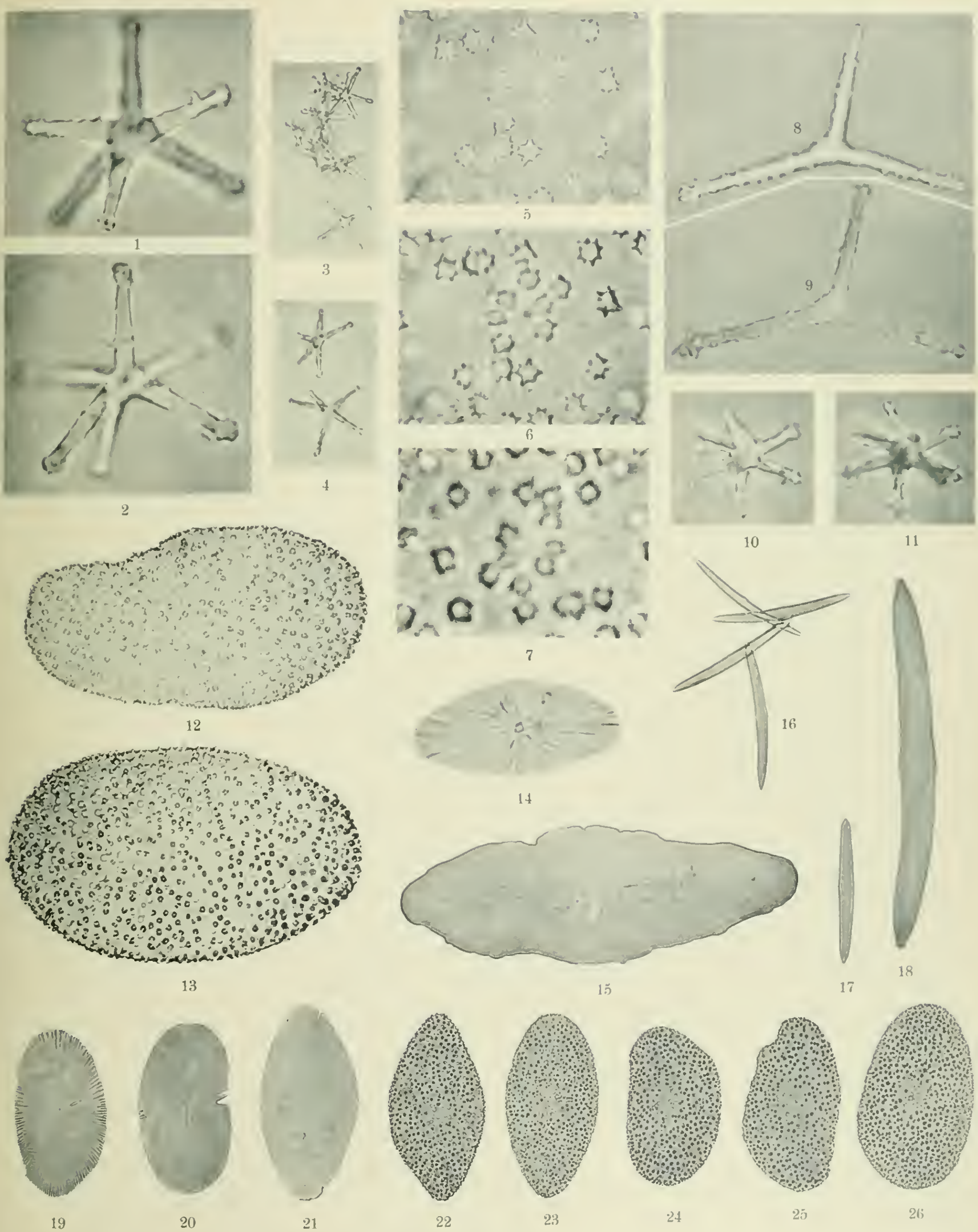

Fig. 1-26 Erylus sollasii n. sp.
1, 2, 4-11, 13-16, 18 race II; 3, 12, 17, 20, 25 race I form C; 19, 22, 24 race I, form A. 21, 23, 26 race I, form D.

PLATE 3.

PLATE 3.

Erylus sollasii Lendenfeld.

Figures 1–28. Race III. Large dark specimen from northeast Hawaii.

1.— Side view of a triaene with branched clades, and a reduced, cylindrical, terminally rounded rhabdome; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6.
2–6.— Apical views of cladomes of triaenes; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
  2–4, with all clades branched dichotomously or in a more complicated manner;
  5, 6, with only two clades thus branched and the third simple.
7, 8.— Parts of large acanthtylasters; magnified 1800; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10.
9–11.— Aspidasters; magnified 350; phot. Zeiss, apochr. 4, compens. oc. 6:
  9, a perfectly adult one;
  10, a nearly adult one;
  11, a young, still smooth one.
12.— Side view of a triaene with branched clades; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6.
13.— Two isoactine microrhabds; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6.
14, 15.— Two isoactine microrhabds; magnified 540; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10.
16, 17.— Aspidasters; magnified 540; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10:
  16, a young one;
  17, an adult one.
18.— Promonaene-like style, abruptly bent near the pointed end; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6.
19–22.— Rhabd megascleres; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
  19, 20, large amphioxes;
  21, style;
  22, small amphiox.
23, 24.— Side views of triaenes; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
  23, with three-branched clades;
  24, with simple and two-branched clades.
25, 26.— Groups of microscleres from centrifuge-spicule preparations; magnified 540; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10:
  a, microrhabd; b, small, most probably foreign, sphaeraster; c, large acanthtylasters; d, very young aspidasters.
27.— View of the largest specimen; natural size; phot. Zeiss, anastig. 480/412 mm.
28.— Part of the surface of an adult aspidaster; magnified 1800; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10.

Erylus oxyaster Lendenfeld.

Figures 29–35.

29–35.— Microscleres and groups of such from centrifuge-spicule preparations; magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10:
  a, (Figs. 29–32, 35) microrhabds;
  b, (Fig. 35) large diactine oxyaster;
  c, (Fig. 34) large triactine oxyaster with one ray reduced;
  d, (Figs. 32, 33, 35) large oxyasters with three or more fully developed rays;
  e, (Fig. 32) small oxyaster with numerous rays.

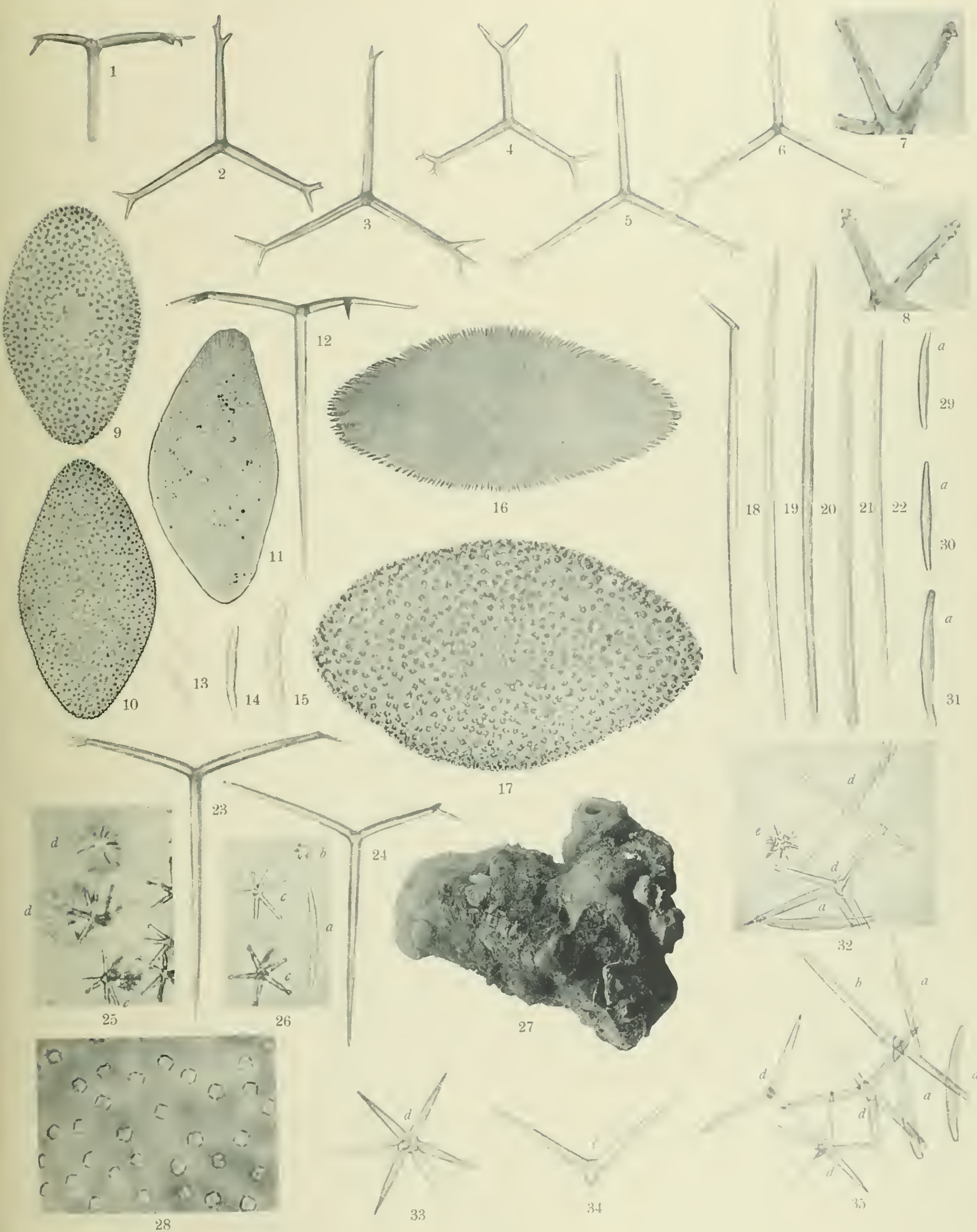

Fig. 1-28 Erylus [illegible]lasii n. sp. (race III)
Fig. 29-35 Erylus oxyaster n. sp.

PLATE 4.

PLATE 4.

Erylus oxyaster LENDENFELD.

Figures 1–43.

1–23.— Megascleres; magnified 30; phot. Zeiss, planar 20 mm.:

1, apical view of the cladome of a dichotetraene;

2–5, apical views of cladomes of dichotriaenes;

6, 7, pointed, straight, or slightly curved amphioxes;

8, pointed, angularly bent amphiox;

9, blunt, slightly curved amphiox (amphistrongyle);

10, 11, styles;

12–14, amphiox-derivates, strongly angularly bent near one end, like monaenes;

15, 16, amphiox-derivate with a vertically arising branch-ray, like mesomonaenes;

17–19, amphiox-derivates with two or three branch-rays, like meso- or amphiclades;

20, side view of a plagiotriaene;

21, side view of a triaene with one simple and two bifurcate clades;

22, 23, side views of dichotriaenes.

24.— View of the sponge; natural size; phot. Zeiss, anastig. 480/412 mm.

25.— Part of a superficial, paratangential section showing a pore; magnified 200; phot. Zeiss, apochr. 8, compens. oc. 6.

26–34.— Microscleres and groups of such from centrifuge-spicule preparations; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6.:

a, (Figs. 26, 28–33) microrhabds;

b, (Fig. 27) large monactine oxyaster;

c, (Fig. 28) large diactine oxyaster;

d, (Figs. 26, 30) large triactine oxyasters;

e, (Figs. 30, 32–34) large oxyasters with four or more rays;

f, (Figs. 29, 30) small oxyasters with numerous rays.

35.— The umbilical face of an aspidaster; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6.

36, 37. – Part of the surface of the umbilical face of an aspidaster; magnified 2000; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

36, focused lower; 37, focused higher.

38.— A ray of a large oxyaster; magnified 2000; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10.

39, 40.— A small oxyaster with numerous rays; magnified 2000; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

39, focused lower; 40, focused higher.

41–43.— Aspidasters; magnified 150; phot. Zeiss, apochr. 8; compens. oc. 6:

41, rare, nearly circular aspidaster;

42, 43, ordinary, elongate aspidasters.

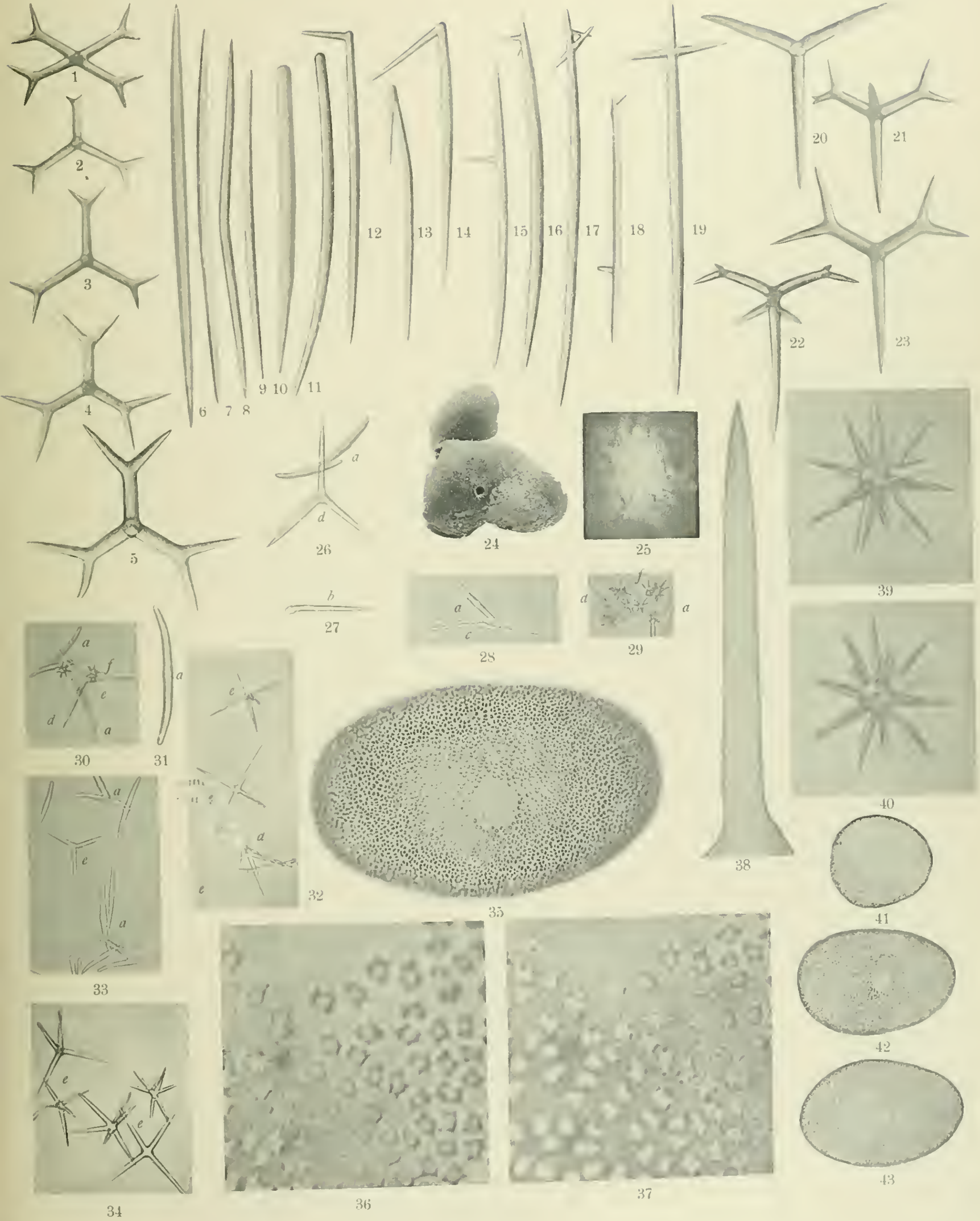

Fig. 1-43 Erylus oxyaster n. sp

PLATE 5.

PLATE 5.

Erylus rotundus Lendenfeld.

Figs. 1, 3, 11–13.	— var. typica Lendenfeld. Form D. Northeast Hawaii.
Figs. 2, 4, 17.	— var. typica Lendenfeld. Form B. Kauai.
Figs. 5, 26–28, 31.	— var. cidaris Lendenfeld.
Figs. 14, 15.	— var. typica Lendenfeld. Form C. Kauai.
Figs. 16, 30.	— var. typica Lendenfeld. Form A. South Molokai.
Figs. 18–22, 32.	— var. megarhabda Lendenfeld. Form A. South Molokai.
Fig. 23.	— var. megarhabda Lendenfeld. Form B. Kauai.

Erylus caliculatus Lendenfeld.

Figures 6–10, 24, 25, 29.

1–7.— Apical views of triaene-cladomes; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
1, 3, of *Erylus rotundus* var. *typica* from northeast Hawaii (form D);
2, 4, of a dark specimen of *Erylus rotundus* var. *typica* from Kauai (form B);
5, of *Erylus rotundus* var. *cidaris*;
6, 7, of *Erylus caliculatus*.

8–10.— Side views of triaenes of *Erylus caliculatus*; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6.

11–15.— Amphioxes of *Erylus rotundus* var. *typica*; magnified 100; photo. Zeiss, apochr. 16, compens. oc. 6:
11–13, of a specimen from northeast Hawaii (form D);
14, 15, of a light specimen from Kauai (form C).

16, 17.— Groups of megascleres from spicule-preparations of *Erylus rotundus* var. *typica*; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
16, of a specimen from South Molokai (form A);
17, of a dark specimen from Kauai (form B);
a, sharp-pointed amphioxes; b, blunt amphiox (amphistrongyle); c, style.

18–23.— Rhabd megascleres of *Erylus rotundus* var. *megarhabda*; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
18, an amphistrongyle of a specimen from South Molokai (form A);
19–22, amphioxes of a specimen from South Molokai (form A);
23, an amphiox of a specimen from Kauai (form B).

24–28.— Groups of spicules from spicule-preparations; magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
24, 25, of *Erylus caliculatus*;
26–28, of *Erylus rotundus* var. *cidaris*;
a, (Figs. 24–28) amphioxes;
c, (Fig. 24) style;
d, (Fig. 26) triaene;
e, (Fig. 27) microrhabd;
f, (Figs. 24, 27, 28) aspidasters;
g, (Figs. 24, 27) acanthtylasters.

29–32.— Views of whole specimens; phot. Zeiss, anastig. 480/412 mm.:
29, *Erylus caliculatus*; natural size;
30, *Erylus rotundus* var. *typica* from South Molokai (form A); magnified 1: 1.08.
31, *Erylus rotundus* var. *cidaris*; magnified 1: 1.13;
32, *Erylus rotundus* var. *megarhabda* from South Molokai (form A); magnified 1: 1.08.

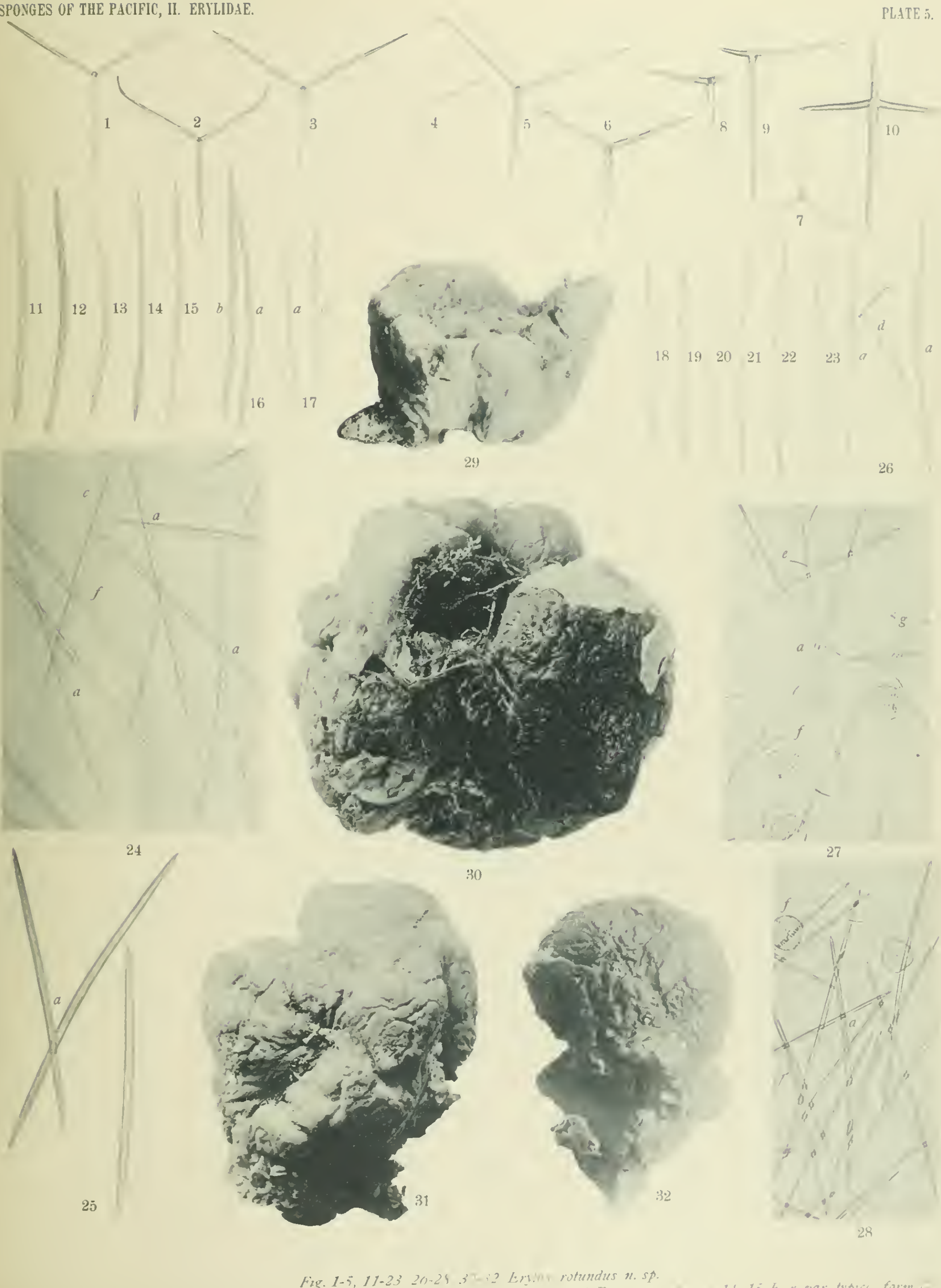

Fig. 1-5, 11-23, 26-28, 30-32 Erylus rotundus n. sp.
1, 3, 11-13 E. r. var. typica, form D; 2, 4, 17 E. r. var. typica form B; 5, 26-28, 31 E. r. var. ciliaris; 14, 15 E. r. var. typica form C;
16, 30 E. r. var. typica, form A; 18-22, 32 E. r. var. megarhabda, form A; 23 E. r. var. megarhabda form B
Fig. 6-10, 24, 25, 29 Erylus caliculatus n. sp.

PLATE 6.

PLATE 6.

Erylus caliculatus LENDENFELD.

Figures 1–13, 19–23, 26, 28, 29.

Erylus rotundus LENDENFELD.

Figs. 14, 18, 24, 33–35. — var. megarhabda LENDENFELD. From A. South Molokai.
Figs. 15–17, 25, 30–32. — var. typica LENDENFELD. Form B. Kauai.
Fig. 27. — var. typica LENDENFELD. Form A. South Molokai.

1, 2.— Microrhabds of *Erylus caliculatus:* magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10.

3.— Small oxysphaeraster of *Erylus caliculatus*; magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10.

4, 5.— Groups of microscleres from a centrifuge-spicule preparation of *Erylus caliculatus*; magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10:
a, microrhabds; b, acanthtylasters.

6–13.— Acanthtylasters of *Erylus caliculatus*; magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10.

14.— Group of microscleres from a centrifuge-spicule preparation of *Erylus rotundus* var. *megarhabda* from South Molokai (form A); magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10:
b, acanthtylasters; c, small oxysphaeraster.

15, 16.— Acanthtylasters of a dark specimen of *Erylus rotundus* var. *typica* from Kauai (form B); magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10.

17–22.— Aspidasters; magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10:
17, nearly adult aspidaster of a dark specimen of *Erylus rotundus* var. *typica* from Kauai (form B);
18, adult aspidaster of a specimen of *Erylus rotundus* var. *megarhabda* from South Molokai (form A);
19, adult, circular aspidaster with numerous protruding rays of *Erylus caliculatus*;
20, young, circular aspidaster with few protruding rays of *Erylus caliculatus*;
21, adult, reniform aspidaster with numerous protruding rays of *Erylus caliculatus*;
22, young, smooth, reniform aspidaster of *Erylus caliculatus*.

23.— Superficial, paratangential section of *Erylus caliculatus*; magnified 30; phot. Zeiss, planar 20 mm.

24.— Radial section through the superficial part of *Erylus rotundus* var. *megarhabda* from South Molokai (form A); magnified 10; phot. Zeiss, planar 50 mm.

25.— Radial section through the choanosome of a dark specimen of *Erylus rotundus* var. *typica* from Kauai (form B); magnified 20; phot. Zeiss, planar 20 mm.:
a, radial bundle of rhabd megascleres.

26.— Radial section through the superficial part of *Erylus caliculatus*; magnified 30; phot. Zeiss, planar 20 mm.:
a, radial bundle of rhabd megascleres.

27.— Paratangential section, a small distance below the surface, of *Erylus rotundus* var. *typica* from South Molokai (form A); magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6:
a, group of triaene-cladomes.

28, 29.— Radial sections through the choanosome of *Erylus caliculatus*; aniline-blue:
28, magnified 200; phot. Zeiss, apochr. 8, compens. oc. 6;
29, magnified 100; phot. Zeiss, apochr. 16, compens. oc. 6.

30–35.— Microrhabds of *Erylus rotundus*; magnified 600; u. v. phot. Zeiss, q. monochr. 6, q. oc. 10:
30–32, of a dark specimen of var. *typica* from Kauai (form B);
33–35, of a specimen of var. *megarhabda* from South Molokai (form A).

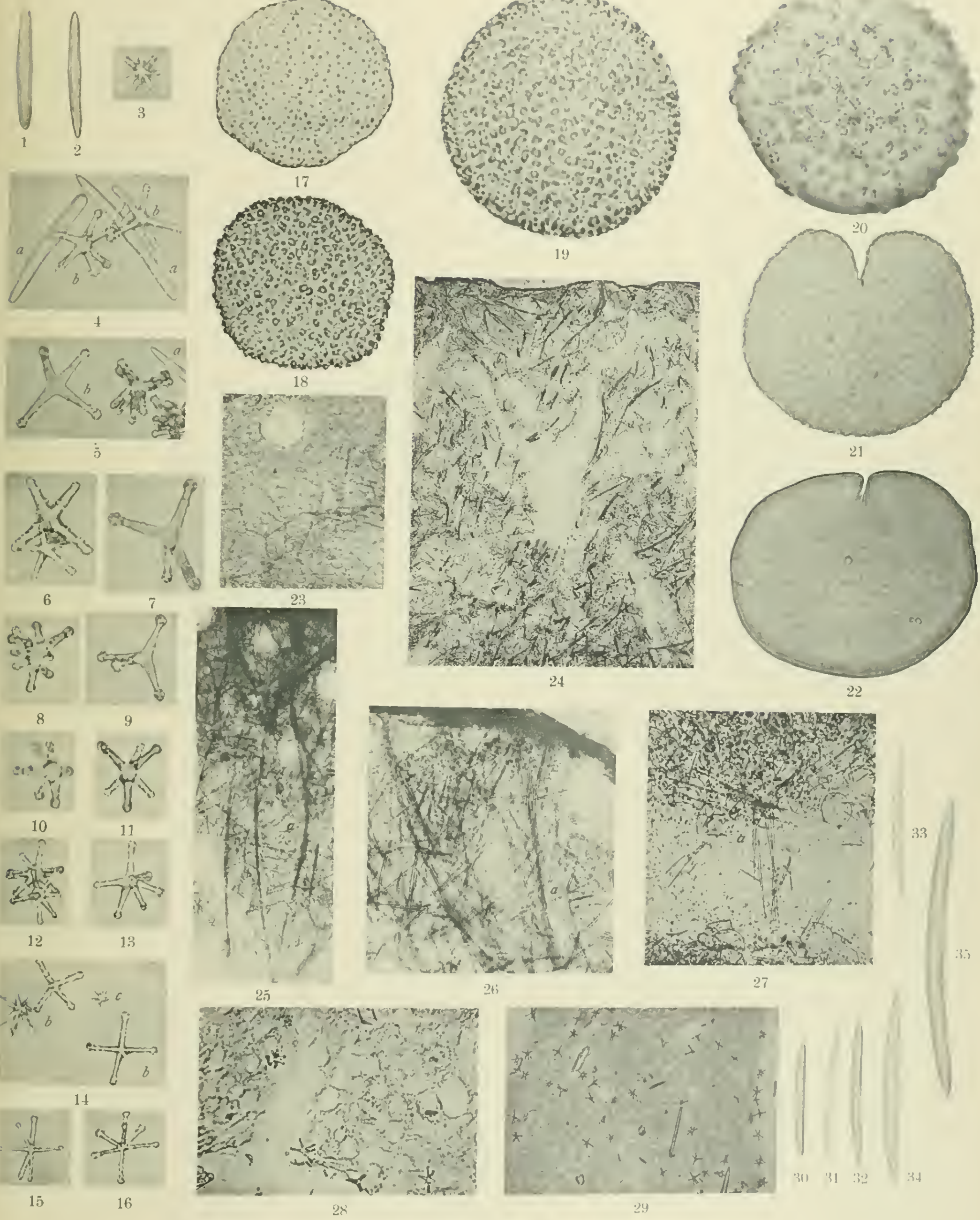

Fig. 1-13, 19-23, 26, 28, 29 Erylus caliculatus n. sp.
Fig. 14-18, 24, 25, 27, 30-35 Erylus rotundus n. sp.
14, 18, 24, 33-35 E. r. var. megarhabda, form A; 15-17, 25, 30-32 E. r. var. typica form B. 27 E. r. var. typica, form A

PLATE 7.

PLATE 7.

Erylus rotundus Lendenfeld.

Figs. 1–10, 12–45, 75, 76, 79.	— var. cidaris Lendenfed.
Figs. 16, 46, 48, 54.	— var. typica Lendenfeld. Form B. Dark specimen. Kauai.
Figs. 17, 18, 49–51, 53.	— var. typica Lendenfeld. Form A. South Molokai.
Figs. 19–21, 55, 56.	— var. typica Lendenfeld. Form C. Light specimen. Kauai.
Figs. 22–24, 26, 27, 30; 57–59, 66–73.	— var. megarhabda Lendenfeld. Form A. South Molokai.
Figs. 25, 28, 29, 60–65.	— var. megarhabda Lendenfeld. Form B. Kauai.
Figs. 47, 52.	— var. typica Lendenfeld. Form D. Northeast Hawaii.

Erylus caliculatus Lendenfeld.

Figures 11–15, 31–41, 74, 77, 78, 80.

1–10.— Branched amphiox-derivates and oxyastrose rhabd-clusters of *Erylus rotundus* var. *cidaris*; magnified 200; phot. Zeiss, apochr. 8, compens. oc. 6:
- 1–3, long amphioxes with two or three shorter branches;
- 4–10, oxyastrose rhabd-clusters.

11–15.— Oxysphaerasters of *Erylus caliculatus*; magnified 2000; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:
- 11, an oxysphaeraster with thicker rays, focused higher;
- 12, the same, focused lower;
- 13, an oxysphaeraster with thinner rays, focused high;
- 14, the same, focused intermediate;
- 15, the same, focused low.

16–21.— Aspidasters of *Erylus rotundus* var. *typica*; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6:
- 16, of a dark specimen from Kauai (form B);
- 17, 18, of a specimen from South Molokai (form A);
- 19–21, of a light specimen from Kauai (form C).

22–30.— Aspidasters of *Erylus rotundus* var. *megarhabda*; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6:
- 22, 23, young aspidasters without protruding rays, of a specimen from South Molokai (form A);
- 24, 26, 27, 30, adult aspidasters of a specimen from South Molokai (form A);
- 25, 28, 29, adult aspidasters of a specimen from Kauai (form B).

31–41.— Aspidasters of *Erylus caliculatus*; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6:
- 31, a very young, circular aspidaster showing the fine radial rays forming the disc;
- 32–35, young, circular aspidasters with few protruding rays;
- 36, 37, adult, circular aspidasters with numerous protruding rays;
- 38–40, young, reniform aspidasters with few protruding rays;
- 41, adult, reniform aspidaster with numerous protruding rays.

42–45.— Aspidasters of *Erylus rotundus* var. *cidaris*; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6:

46–80.— Microscleres and groups of such from centrifuge-spicule preparations; magnified 300; phot. Zeiss, apochr. 4, compens. oc. 6:
- 46, 48, 54, of a dark specimen of *Erylus rotundus* var. *typica* from Kauai (form B);
- 47, 52, of *Erylus rotundus* var. *typica* from northeast Hawaii (form D);
- 49–51, 53, of *Erylus rotundus* var. *typica* from South Molokai (form A);
- 55, 56, of a light specimen of *Erylus rotundus* var. *typica* from Kauai (form C);
- 57–59, 66–73, of *Erylus rotundus* var. *megarhabda* from South Molokai (form A);
- 60–65, of *Erylus rotundus* var. *megarhabda* from Kauai (form B);
- 74, 77, 78, 80, of *Erylus caliculatus*;
- 75, 76, 79, of *Erylus rotundus* var. *cidaris*;
  - a, (Figs. 46–51, 53–57, 60–75, 77–80) microrhabds; b, (Figs. 52–54, 56–60, 75–77) acanthtylasters; c, (Figs. 52, 60, 74, 76) small oxysphaerasters; d, (Figs. 56, 60) very young aspidasters; e, (Fig. 56) adult aspidasters.

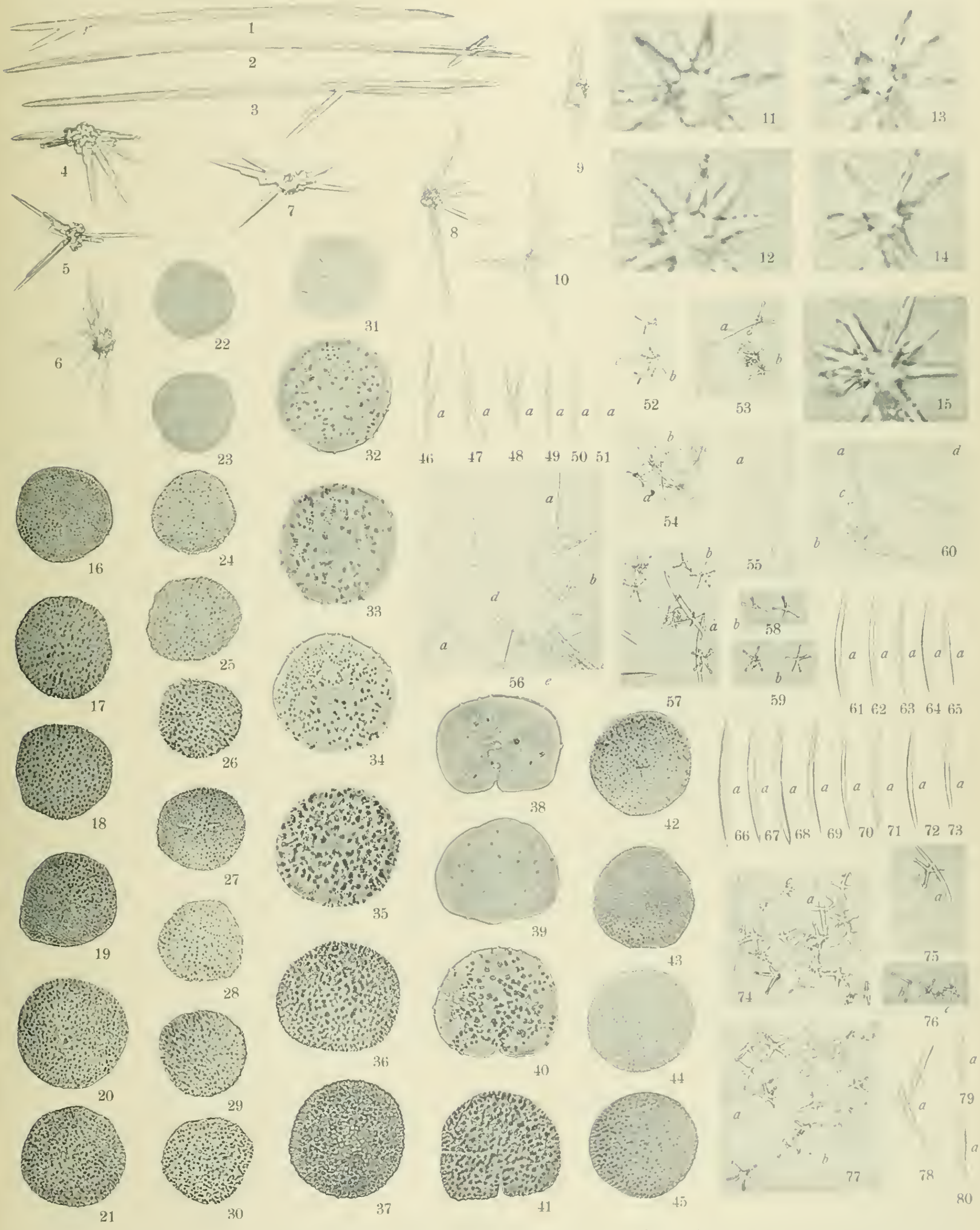

Fig. 1-10, 16-30, 42-73, 75, 76, 79 Erylus rotundus n. sp.
1-10, 42-45, 75, 76, 79 E. r. var. cidaris; 16, 46, 48, 54 F. r. var. typica, form B; 17, 18, 49-51, 53 E. r. var. typica, form A; 19-21, 55, 56 E. r. var. typica, form C; 22-24, 26, 27, 3 , 57-59, 66-73 E. r. megarhabda, form A; 25, 28, 29, 60-65 E. r. var. megarhabda, form B; 47, 52 E. r. var. typica. form D.
Fig. 11-15, 31-41, 74, 77, 78, 80 Erylus caliculatus n. sp.

PLATE 8.

PLATE 8.

Erylus caliculatus LENDENFELD.

Figures 1–12, 15–20.

Erylus rotundus LENDENFELD.

Fig. 13.— var. megarhabda LENDENFELD. Form A. South Molokai.
Fig. 14.— var. cidaris LENDENFELD.

1.— Central part of a young aspidaster of *Erylus caliculatus*, showing the rays which form the disc; magnified 2000; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10.

2–12.— Acanthtylasters and parts (rays) of such of *Erylus caliculatus*; magnified 2000; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

- 2, a ray of a very large acanthtylaster;
- 3, a small, rather regular acanthtylaster, focused high; 4, the same, focused low;
- 5, a large regular acanthtylaster, focused high; 6, the same, focused low;
- 7, a small acanthtylaster, some of the rays of which are considerably shortened, focused high; 8, the same, focused low;
- 9, 10, single rays of small acanthtylasters;
- 11, part of a small, particularly thin-rayed acanthtylaster;
- 12, part of a small, particularly thick-rayed acanthtylaster.

13–17.— Marginal parts of aspidasters; magnified 2000; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

- 13, of an adult aspidaster of *Erylus rotundus* var. *megarhabda* (form A) from South Molokai;
- 14, of an adult aspidaster of *Erylus rotundus* var. *cidaris*;
- 15a, of a young, still quite smooth aspidaster of *Erylus caliculatus*;
- 15b, 16 of young aspidasters with only few protruding rays, of *Erylus caliculatus*;
- 17, of an adult aspidaster with numerous protruding rays, of *Erylus caliculatus*.

18–20.— Portions of the surface of the central parts of aspidasters of *Erylus caliculatus*; magnified 2000; u. v. phot. Zeiss, q. monochr. 1.7, q. oc. 10:

- 18, of an aspidaster not quite fully developed;
- 19, of a fully developed aspidaster, focused high;
- 20, the same, focused low.

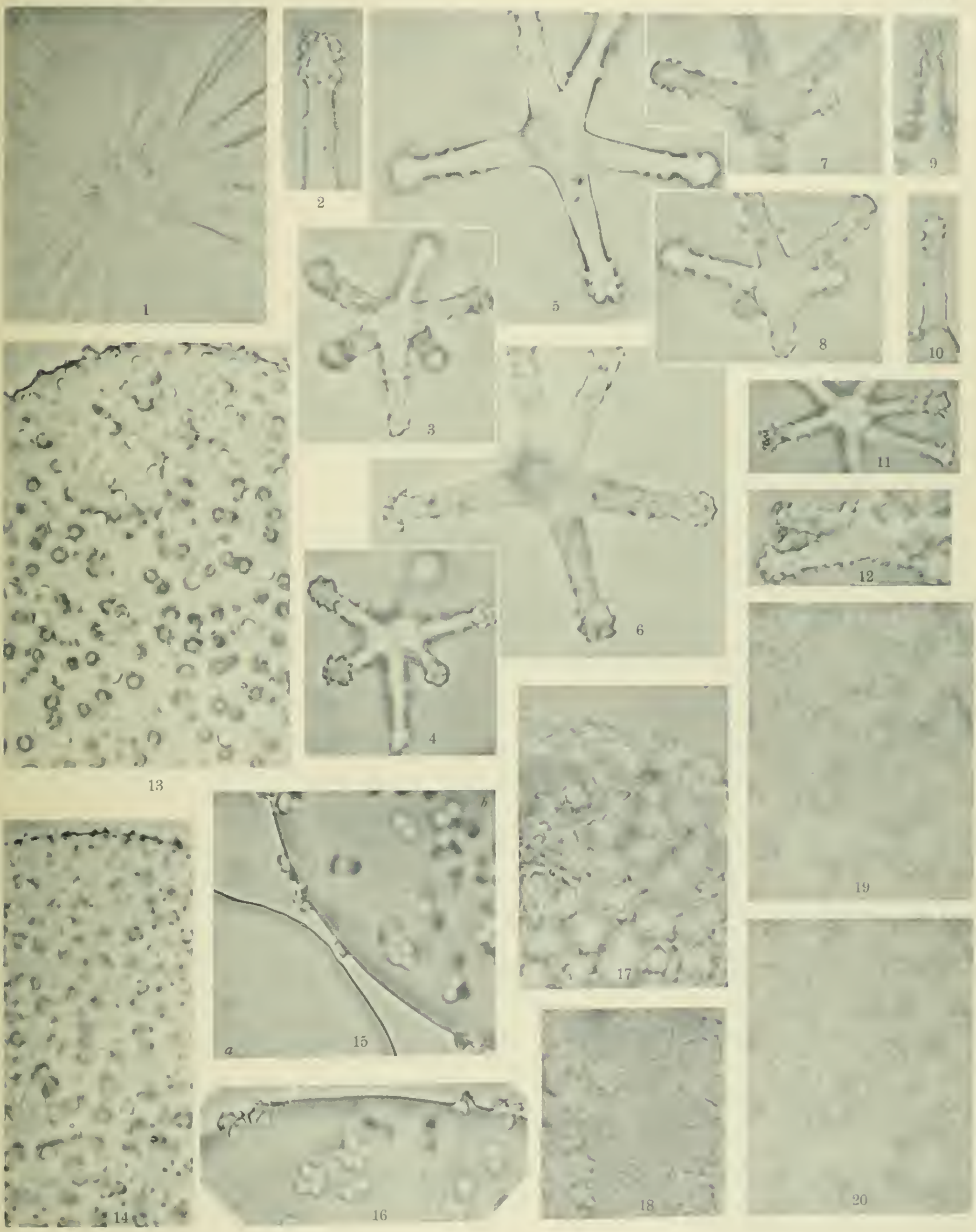

Fig. 1-12, 15-20 Erylus [illegible] n. sp.
Fig. 13, 14 Erylus rot[illegible]ndus n. sp.
13 E. r. var. megarhabda, form A; 14 E. r. var. [illegible]

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1-4